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This is a factual report on an apartment house management program—how it was developed, how it is being carried out, and the results obtained. The manager says of it, "It is one of the most fascinating and challenging jobs we have ever had."

THE STORY OF THE FORD APARTMENTS

by Ralph F. D'Oench, CPM

THE PROPERTY is the Ford Apartments in St. Louis, now known as Ford-on-the-Plaza, a 14-story, private enterprise apartment building at the northwest corner of 14th and Pine Streets, facing Memorial Plaza.

During a period of about three years, a management program was developed as the result of study of the location, the building, its floor plan, equipment, rentals, earnings, financing, operating staff, payroll, clientele, and "community acceptance."

The location, facing the Plaza, was good. But behind the building was an area considered to be blighted. The building could turn its back on this blighted area, but the management program had to consider this environmental influence. Ultimate redevelopment of the area should eliminate this undesirable factor.

The building itself is of reinforced concrete construction, and contains a cocktail lounge and restaurant on the ground floor, and 104 efficiency apartments, 13 units of which have one bedroom. The ceilings are exposed concrete, of beam and pan construction. Skillful decorating treatment of these surfaces would make the apartments acceptable to tenants, and thus reduce this element of resistance.

MR. D'OENCH *is president of the Ralph D'Oench Company in St. Louis.*

The floor plan is "tight," every inch of space used. But there is a guest closet in each unit, as well as a dressing room with shelves and pole, and space for a chest of drawers. More shelves can be added, room dividers can be used to separate the functions of the living room, and again, decorating can make the units appealing.

Principal items of equipment are high-speed automatic freight and passenger elevators, electronic-controlled pressure water tank in the basement, and two submerged steam hot water heaters. There is no boiler, steam being purchased from the Union Electric Company.

Apartment equipment consisted of a Pullman kitchen, with gas range, four-cubic-foot refrigerator, sink without disposal or dishwasher, steel drawers and cabinets. No air conditioning! All baths have tub and shower, and all floors are covered with asphalt tile.

Rentals for the apartments were scheduled at a maximum of $10,915 per month, an over-all average of $49.55 per room per month, or $3.55 per square foot, $101.19 per month, for the single-unit apartments; $2.74 per square foot, $131.34 per month, for the bedroom units. The rents were not too high, but the space was not worth the rent. We would build up the value of the

North side of Pine Street, St. Louis, Reed Hotel at corner of 15th, with nondescript buildings between it and the Ford Apartments at 14th Street. January, 1955

space and create prestige value for the building.

Earnings under the previous management by the owner had climbed from $128,000 in 1951 to $140,000 in 1953, and then had declined sharply to $132,000 by 1954. Earnings were still in declining trend by January 10, 1955, when we took over. New management would have to stop this decline, and the new program would have to turn the trend upward again. Careful appraisal of the rental situation justified the belief that these two things could be done.

The operating staff was inadequate and lacked training. The resident manager, called "director of management," was a person of considerable ability, but desired to be relieved of her duties within 60 days.

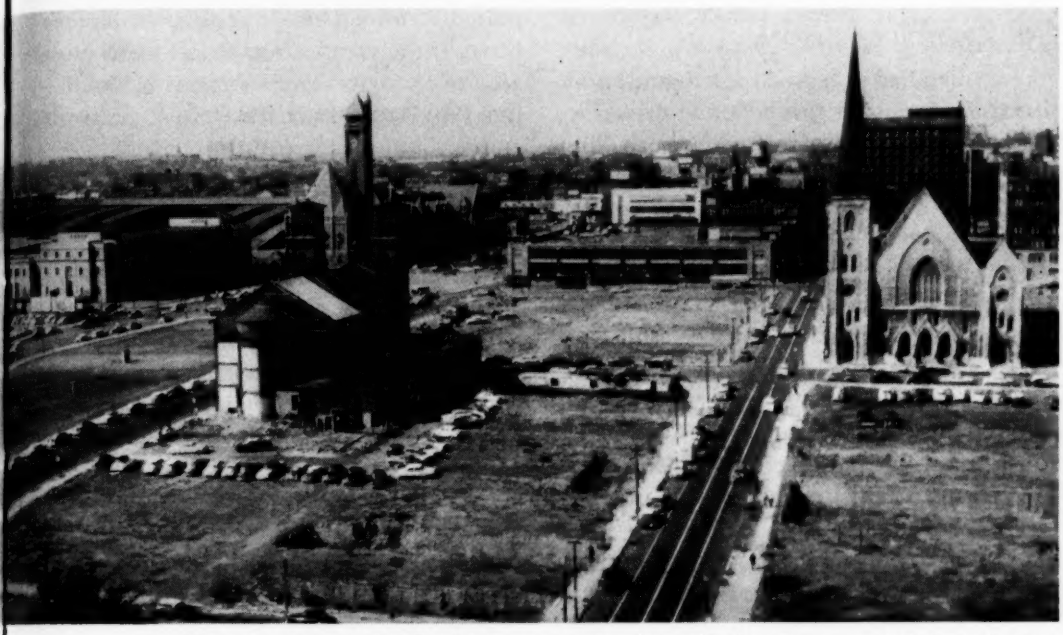
For the most part, the clientele of the property was just a list of names on the rent roll. Except for a few cases, no information was available as to tenants' occupations, references, earnings, and so on. There was not even a census of the building to show the number of couples, the number of single persons living alone, the number of apartments shared by two men, or apartments shared by two women.

Furthermore, the building has an unsavory reputation. So for "community acceptance," there was a very low rating. Some business firms and one branch of the armed services had declared the Ford "off limits." Prestige? There was none, and the essence of the management program was to strive for prestige and maintain it.

There was no parking space for tenants' cars—not a single meter space in the adjoining streets, no provision for parking on the vacant lot to the west, acquired with the building.

Entrance to Ford Apartments, with vacant lot adjoining on west not surfaced for parking. January, 1955

Same vacant lot, cleared of debris and paved for parking use.



Plaza view from roof of Ford Apartments, showing redevelopment area, 15th Street in foreground, Pine Street west (with stripes), St. John's Basilica, and Centenary Methodist Church. Other buildings in background left to right: U.S. Post Office, Union Station, 18th St. Garage, and Salvation Army's Evangeline Residence.

THE CHALLENGE

There was therefore this 3-point challenge to be met by the management program immediately: (1) replace the manager, and perhaps the whole staff; (2) provide parking for tenants; and (3) win public acceptance *of* and *for* the building.

There had been no indication that we would fall heir to the ill-will of the St. Louis Land Clearance Authority, which had planned the acquisition and clearance of 8½ city blocks in the Plaza area, and was engineering redevelopment of the area with 1,100 apartment units by a private redeveloper. This project had been widely publicized, and of course had to be considered as a background and potential competition for the Ford management program.

When we took over, we had our program fairly well outlined but with details not yet formulated. It was hoped that these could be worked out one by one as we went along.

Interviewing candidates for the manager's job was the first order of business. One month later, Grace L. Cleaver, a graduate of Bryn Mawr College and recently associated with the management of exclusive Old Warson County Club in St. Louis County, was installed as resident manager. She had been reluctant to accept the job, but the outline of the management program and its objectives outweighed the reputation of the building.

Simultaneously, a permit was applied for and obtained from the City Building Commissioner to construct a concrete driveway entrance to the vacant lot west of the building, and to clear and surface this lot for parking purposes.

THE TROUBLES BEGIN

Workmen had prepared the subgrade and placed the forms for this concrete driveway and new sidewalk in front of the parking lot. The concrete was on the way! Suddenly a police car, siren screaming, dashed up to a screeching stop. Officers with shotguns poised rushed out and ordered the workmen to cease work.

The contractor exhibited the building permit, legally and legitimately obtained, and after considerable argument was allowed to proceed with the work. Thus some private off-street parking was provided for the apartment tenants, and the second challenge was met.

We learned that the police action was instigated by the Land Clearance Authority and that the Authority had intended to condemn the lot and acquire it as part of the area for redevelopment.

The reputation of the Ford did not at first seem to be such an alarming factor as to require immediate drastic action. But soon a visit by some of the high brass of the Police Department revealed that a certain tenant in the building was not only a "bookie" but also apparently a member of an underworld syndicate which was operating in the building without the knowledge of the previous management.

What next! General MacArthur said, "The difficult we do at once, the impossible takes a little longer." MacArthur was right. It took seven months!

With nine vacancies on take-over, and more shortly after, the management was faced with housecleaning of undesirables, which meant still more vacancies.

Fully supported by the owners in this phase of the program, the undesirables were gradually identified, ferreted out, and vacated without any "scenes," publicity or police action. This "finessing of tenants" brought the vacancy total of 21 units out of 104—over 20 per cent, a staggering handicap in a rental market characterized as sluggish and without pressure of demand.

HOW TO CREATE DEMAND?

Some new theme had to be introduced in the advertising. Something must be done to create prestige for the property and thus win public acceptance.

The first thing we did was to change the name from Ford Apartments to Ford-on-the-Plaza. This change retained the good name of James L. Ford, Jr., civic leader who headed the program of smoke elimination in St. Louis and for whom the building was named. Adding the words identifying the location, gave quite a euphonious result.

Intensified newspaper classified and display advertising stressed the ease of living in these downtown efficiency apartments, within walking distance of office buildings, theaters and stores. Newly furnished model apartments were opened to show how attractive the units could be.

A new rental brochure was prepared by a top-flight advertising expert, printed on quality buff paper with profuse illustrations of the apartments, views of the Plaza, floor plan, and a list of leading business and industrial firms whose people had accepted the Ford as "*the* place to live."

The next thing was to get other business firms to accept the Ford, and lift the taboo they had put on its apartments for their people.

A personal solicitation campaign among business leaders was begun. Not one of them refused to grant an interview. The opening remarks of each interview were: "Mr. Leader, we represent the Ford Apartments. We want you to know *the Ford is clean*." This approach proved its merit. Every busi-

ness firm called on accepted the Ford and removed its off-limits restriction.

Thus the rental campaign continued, renting improved and Ford occupancy increased month by month in spite of the competition of other new but cheaper apartments, particularly suburban garden-type projects. By January 10, 1956, after one year of our management, every rentable unit in Ford-on-the-Plaza was occupied on a lease basis, and one or two names were on the waiting list. Since then, occupancy has continued at 100 per cent and waiting has grown.

Summer occupancy was increased by obtaining room air conditioners at wholesale and letting tenants have them at our cost, if desired. Two units were installed on a rental basis. Gross income was increased by expanding services to tenants, thereby increasing service income items.

The success of the Ford in achieving 100 per cent occupancy, with a discriminating and acceptable clientele, portends success for the redevelopment project planned for the Plaza area. The policy of knowing your tenant by securing information on employment, references, and annual income, has proved itself by the record of gross income produced at the Ford. This was over $144,000 for the fiscal year which ended October 31, 1956.

This record shows also that property management by Accredited Management Organization is not an expense to the owner but an investment returnable with a profit.

The Famous Lecture Course

"Principles of Real Estate Management"

Final School for 1957 • September 14-21 • Boston, Mass.

Ideas on how to:

- *Obtain new management accounts.*
- *Assume management of a building.*
- *Increase a building's income.*
- *Recognize real estate trends.*
- *Operate a property management department profitably.*
- *Employ methods of successful property managers.*
- *Select and hold tenants.*
- *Set rent schedules.*
- *Set up accounting records.*
- *Prepare owners' statements.*
- *Modernize, convert and rehabilitate older properties.*
- *Qualify for the designation, "Certified Property Manager."*

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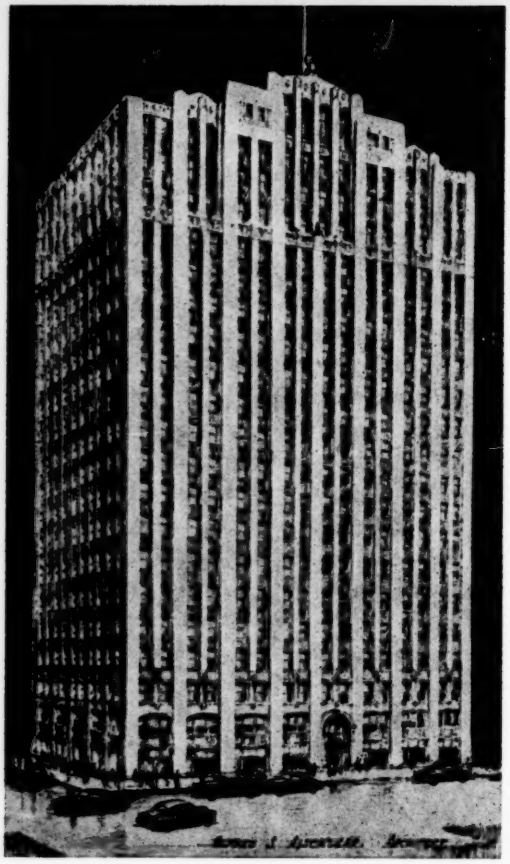


This is the story of the Jackson-Franklin Building, 309 W. Jackson Boulevard, Chicago. It is a story of changes in character of tenants as well as changes in the building itself.

VITAL STATISTICS. Erected in 1929, with occupancy beginning in 1930. Rentable area approximately 256,000 square feet. Heat and high pressure steam supplied by three Freeman Scotch Marine boilers with Dutch ovens. Elevator service furnished by nine Otis elevators: four passenger, four combination freight and passenger, and one car used exclusively for freight purposes. Elevators did not serve the 22nd floor. The building was entirely sprinklered.

Located at the southwest corner of Jackson Boulevard and Franklin Street, in what was known in 1929 as the heart of the wholesale district, the building was entirely occupied by tenants identified with the clothing industry. Most of the occupants represented the top lines in that industry.

WHAT HAPPENED?

STAGES IN THE LIFE O

A Story in Modernization

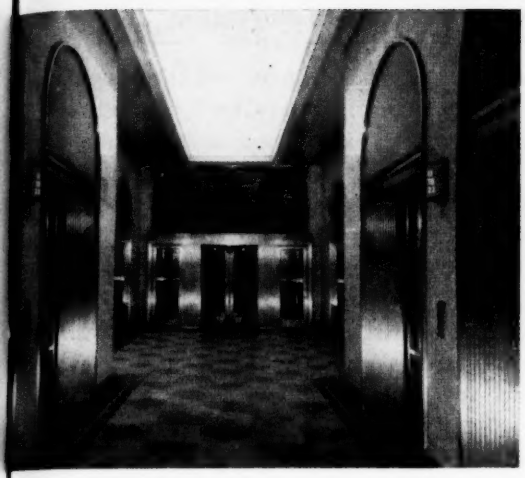
WITHIN A FEW YEARS, through the movement of many of its tenants into Chicago's great Merchandise Mart building, and because of the generally unsettled condition of the entire clothing industry, the Jackson-Franklin Building began having difficulty. In 1938, less than ten years after the building opened for business, control of the property was acquired by the present corporate interests, and Mr. Henry C. Tresch was elected vice-president and manager for the corporation.

Mr. Tresch and his associates on the corporation's board of directors quickly came to the conclusion that it was unwise to seek tenants of the type then remaining in the area. They reasoned that the building's proximity to Chicago's financial and insurance districts, together with the excellent transportation facilities immediately adjacent to the area, should make the building attractive as office space.

The decision to change the type of tenancy immediately forced the new ownership to consider and put into action certain improvements in the building to make it basically attractive to the type of tenant being sought. General business conditions, together with an ownership policy which required that improvements could only be made when tenant procurement demanded such action, limited the initial modernization to a few basic items.

This initial modernization was as follows:

JOHN HILBORN *is manager of the Jackson-Franklin Bldg., whose interesting history is described here.*



In the $35,000 lobby renovation, excessive ornamentation was removed, bronze facing was given to trim around doors, and new (fluorescent) lighting plan was installed. An IBM-operated clock was mounted on marble wall facing entrance.

As demand for space developed and long-term leases were signed, every office was modernized fully, to the tune of over $750,000. Tenants shared cost of the fluorescent lighting, were encouraged to spend their own money in fixing up attractive entrances.

LARGE OFFICE BUILDING

by John T. Hilborn, CPM

Elevators were refurbished. Attractive cabs were installed with carpeting on the floors. The four combination freight and passenger cars were converted to passenger use exclusively. The platforms on these cars were allowed to remain, but the cabs were shortened to normal passenger car size. The traveling system was changed so that four cars traveled to the 22nd floor with express service from the first to eleventh floors. The freight car was allowed to remain in service.

Corridors were covered with rubber tile of an excellent grade. Marble wainscot was placed on the walls.

Toilet rooms, located on every floor of the building, were carefully redecorated and a large part of the fixture installation was replaced.

Lobby was not touched in this initial modernization.

Sprinkler system was allowed to remain. As new tenants were found, the system would be removed on a floor-to-floor basis.

It is well to note that while it was comparatively easy to decide to change the type of tenancy, it was not easy to accomplish the objective. When it is realized that the time of decision was in the late thirties—with all the uncertainties of that period—it can more readily be understood that tremendous and unrelenting effort was required. Many and varied approaches to prospective users were employed and a multitude of unhappy endings resulted. For example, great effort went into the development of a coal dealers' center. This effort was almost a complete fail-

ure; today there isn't a tenant of this type in the building.

One approach which has consistently been followed, was this—*modernization and service* are basic to tenant procurement. At all times the owning corporation was willing to go the limit in modernization of premises for desirable tenants, and this action was followed by an insistence upon quality service for the tenant after occupancy had been accomplished. Needless to say, there were times when cash reserves were close to depletion, but when the chips were down and a responsible tenant was "ready and willing," the corporation did not hesitate to use its credit to procure the necessary funds.

After several years of false starts, the tenant procurement program took shape and when the writer became manager of the building in 1944, the pattern was well established. Only the ground floor and parts of the lower floors had any identification with the original occupancy.

THE FULL TREATMENT

In addition to the early modernization program, during the past 13 years we have carried out another modernization program which has involved the expenditure of more than $2 million.

To begin with, the boilers and the heating system were overhauled. Radiation was increased throughout the building; extensive work went into removal of sludge from heating lines, and careful attention was given to elimination of heat traps. Dutch ovens were removed and all boilers were equipped for oil firing. One boiler was also equipped for gas firing during the summer. The cost of the boiler changeover was approximately $30,000.

It is interesting to note that from the beginning, this plant furnished steam for heat and live steam for many of the buildings and the manufacturers in the area. As a result of this improvement, efficiency increased enormously, our personnel improved in type, outside machine shop costs were virtually eliminated, and to put the "frosting on the cake" we negotiated a heating contract with the largest building in the immediate area which enabled us to recapture the entire cost of the changeover within five years.

Next let's look at the ground floor.

We modernized our lobby at a cost of $35,000. Excessive ornamentation was removed. The trim above and around the fine bronze revolving doors and side doors, and the trim above and around the elevator entrances was given a streamlined bronze facing. Entrances and lobby windows of two stores adjoining the lobby on either side were given a corresponding bronze trim, and Tu-Flex doors were placed in the store entrances. The huge ornamental lighting fixtures were removed. Fluorescent lighting recessed in a cove just below the ceiling now furnishes the light for the lobby. The ceiling was scraped of its former gilt and painted a pleasing reflecting color.

As a central feature the lobby now has a clock on the marble wall facing the entrance. This clock is operated from a central IBM system located in the engineer's office and many tenants of the building are connected to the same system for time clocks and recording devices.

While we did not attempt to re-do the entire lobby, the changes we accomplished have proved to be a lasting investment in tenant good will as we still receive compliments from them on our lobby appearance.

SPEND WHERE IT PAYS

Then came improvements in occupancy and appearance of ground floor frontage.

Following the policy of spending money where we had an opportunity to realize financial benefits from the investment, we concentrated on the corner store. The Stineway Drug Company signed a long-term lease. We installed a new front on the Jackson Boulevard frontage and filled in the Franklin Street frontage with Carrara. We installed an air conditioning system, the necessary plumbing and a terrazzo floor. This job cost $50,000.

For our money we obtained a responsible tenant on a long-term lease, we gave the tenants of the building a needed service, and above all we improved the outward appearance of the building. We had removed the bad first impression that a prospective office tenant would receive on a visit to the building. As a result of this change we eliminated an objectionable restaurant and an equally objectionable cigar store and fountain which formerly flanked the lobby.

Within the past year we have made changes that we are sure will shape the ultimate appearance of our ground floor. Stores located west of the lobby and extending to the west end of the building have been removed. In their place we have installed an office tenant—Illinois Credit Union League—on a long-term lease covering the entire ground floor area. And on the mezzanine floor, installed above the entire ground floor area, we have accommodated the expansion needs of our second-floor tenant. This is created space, and has increased our rentable area more than 5,000 square feet. This entire change has produced a beautiful appearance, and what is equally important, we increased our income by more than $30,000 per year. Our expenditure amounted to $128,000. As soon as it is feasible we intend to make a similar change east of the lobby. However, we never intend to displace the drugstore on the corner.

In passing, we should note that the management is now behind the well-known eight-ball, for office tenants and building ownership are asking, "When will you change the rest of the ground floor?" We are confident that the right tenant or tenants will come along to permit us to complete our ground floor modernization program. (Just as we go to press, word comes that the ground floor job will definitely be finished in 1958!)

ONE OF THE WORST LOOKING FLOORS

With display windows on the Jackson Boulevard and Franklin Street frontages, and the rear windows—on the south—facing an elevated stub platform, the second floor was unattractive for office use.

We tried various methods and secured several tenants of different types but always ended up with dissatisfaction. The present tenant occupied the entire floor as the result of our inability to provide expansion on a floor adjacent to their original occupancy. They agreed to sign a long-term lease on the floor only because they believed the owners and management would keep their promises to make of the second floor the finest office space in the building.

This we have done at a cost of $125,000. But note this—we will pay for the construction in less than six years from the increased rentals we are receiving. (We submit that you cannot lose money from investments like this.)

ALL FLOORS GET IT

In the preceding paragraphs we have mentioned only a portion of the building, but every floor in the building has enjoyed close attention. As demand for the space developed and leases were signed with responsible tenants, usually on a long-term basis,

we completely modernized every space. The sprinkler system was removed, asphalt tile was applied to the floors, exposed steam risers were enclosed, premises were completely rewired and—where desired—acoustic ceilings, fluorescent lighting and attractive office entrances were installed. The cost of the last three items were, in most instances, borne by the tenants. In keeping with our contemporaries in the office building industry, we have always urged our tenants to spend their own money. We believe it increases tenant pride in the space occupied and improves the appearance of our building.

Our own costs for changes within the tenant areas exceeded $750,000, and we estimate that our tenants have paid approximately $250,000 for refinements to their respective spaces.

ELECTRICAL CHANGES

One of the most important and far reaching changes occurred in 1949 when we changed from direct to alternating current. This was forced by the discontinuance of the Congress Street sub-station. We were fortunate that the Commonwealth Edison Company required the changeover, as they defrayed a large portion of the $160,000 expenditure needed to accomplish the job. However, our attention had been focused on the increasing needs of our existing tenants and prospects for more and more power for their ever-increasing business machine operations.

When this change was required by the electric company we had already discovered that we had about exhausted our service, and we had been learning the hard way that our tenants wanted alternating current for business machines and air conditioning. You can see how acute the situation really was when you realize that we had a total service coming into the building of approximately 625 kilowatts. Our service to tenant areas was on a basis that was less than five watts per square foot.

In 1949 we increased the service we were taking from Edison to approximately 1,000 kilowatts. This enabled us to increase our tenant service to approximately 7½ watts per square foot. In July of 1955 the Commonwealth Edison Company notified us that our demand load had reached 988.7. This meant that our consumption had increased more than 50 per cent in less than seven years! You can see what we had to do. Air conditioning and (again) those business machines, and also the ever-increasing demand for fluorescent lighting, required that we again increase our service.

Within the past year we have completed the installation of a power switchboard which permits us to take 1,500 kw additional service from the Edison Company. This action permits us to increase our service to tenant areas to approximately 10 watts per square foot. It also permits us to handle the entire projected power load required for air conditioning and it will (we hope) enable us to take care of the increased requirements of automatic elevators when we install such equipment. The cost of this increased service is $45,000.

We hope we have made an expenditure which will permit us to take care of all power needs for the next ten years. As we are able to realize a profit from the sale of current to our tenants, we do not mind if our tenants continue to use more business machines, more lighting and more cooking facilities for their coffee rooms.

MOST IMPORTANT OF ALL—AIR CONDITIONING

We have invested approximately $1 million for this item. Six years ago we informed

our board of directors that in our opinion the day was not far distant when our building, or any other office building, would not be in the "A" classification without air conditioning. Five years ago we made our first installation for an office tenant. This was a 20-ton package job. One year later we installed a 50-ton central system, and one year later we installed another 50-ton central system. As this is published we will have completed the installation of a year-round central air conditioning system (totaling 875 tons) which enables us to air condition the entire 261,000 square feet in the building.

When we announced our general program of air conditioning, we drew an amazing response. Leases with tenants occupying more than 230,000 square feet were signed up within ninety days. As of this writing, only one tenant with less than 5,000 square feet have not signed leases for the service.

Again—does it pay? We are charging our tenants $0.75 per square foot. We estimate that it will cost approximately $0.41 to amortize on a six per cent basis over 15 years. Operating costs and fan room rental allowances will take up practically all of the difference. We are aware that we could make investments which would produce better returns, but we also realize that the expenditure now made will produce lasting benefits in tenant satisfaction in the years to come and when the going gets just a bit rougher we will be able to sell our prospective tenants space that has year-round air conditioning.

WHAT OF THE FUTURE?

We intend to go on modernizing to keep pace with the requirements of the type of tenant we expect to occupy our space. Within five years it is safe to predict that our building will be served by automatic elevators. If our tenants require electrical service of 15 to 20 watts per square foot, they are going to have this service.

In forecasting such improvements for the future, it will be said that the Jackson-Franklin Building owners and management are ignoring decentralization. In our opinion decentralization is over-emphasized. Today we are enjoying 100% occupancy and we believe the desirability of the Central Area is a most important factor. We continually stress the fact that Chicago's Central Area has the largest office employee pool in the Middle West—more than 800,000 people come to work in this area every day in the week.

We direct the attention of tenants and prospective tenants to the many important services available to them and their employees in the Central Area—unequalled transportation and recreational facilities; more and better restaurants, shopping for all wage brackets and opportunities for advanced education afforded by the schools and colleges within walking distance of every downtown building, and many other advantages important to employees of office people.

With all of these advantages together with the know-how to turn out a square foot of space at the lowest rental commensurate with good service, we believe that Central Area building owners and managers have little to fear from this thing called "decentralization."

Trans World Airlines had been planning for several years to consolidate its Kansas City administrative offices into one central location. The world-wide airline had offices in four downtown locations and the management was desirous of obtaining a more functional office procedure by locating the various departments under one roof. Here's how the firm of Oppenheimer Industries, Inc., was able to serve the situation and obtain the management under a most unusual agreement.

KANSAS CITY'S NEW TWA BUILDING . . .
and how it grew

by Robert S. Selinger, CPM

OUR FIRM had been managing one of the few remaining large vacant tracts in or near the downtown which was suitable for a large-scale office building development with parking. We had cleared the site of the old Muelebach Brewery and were operating a parking station and leasing the balance to a used car lot. The site had 250 feet on Baltimore Avenue and 300 feet on the adjacent street to the east and 235 feet on the cross street. We had a single-story building with roof parking, with access from the dividing alley, under construction for seven national tenants on the north 200 feet of Main Street, the east boundary of the tract.

A proposal was submitted to Trans World Airlines for a 130,000 square foot, two- and three-story, L-shaped building with basement parking extending 250 feet on Baltimore, bridging the alley between Baltimore and Main and occupying 100 feet with three-story level on Main Street. The net lease was for 15 years, with two five-year options. We obtained a commitment from a life insurance company to buy the package upon completion and acceptance of the building by Trans World Airlines.

Through the concerted efforts of local Trans World Airlines' executives and officials, and the support of representatives of national firms who were already located in the neighborhood, Trans World Airlines' board of directors approved the move from the immediate downtown into a building on the fringe of downtown, designed expressly for their use.

Construction costs were negotiated with the builder, interim financing arranged, and all loose ends tied up to complete the move, with the exception of management of the building. It was Trans World Airlines' intention to make only a single rent payment, which would include all services and taxes, insurance and maintenance. It was the life insurance company's desire to re-

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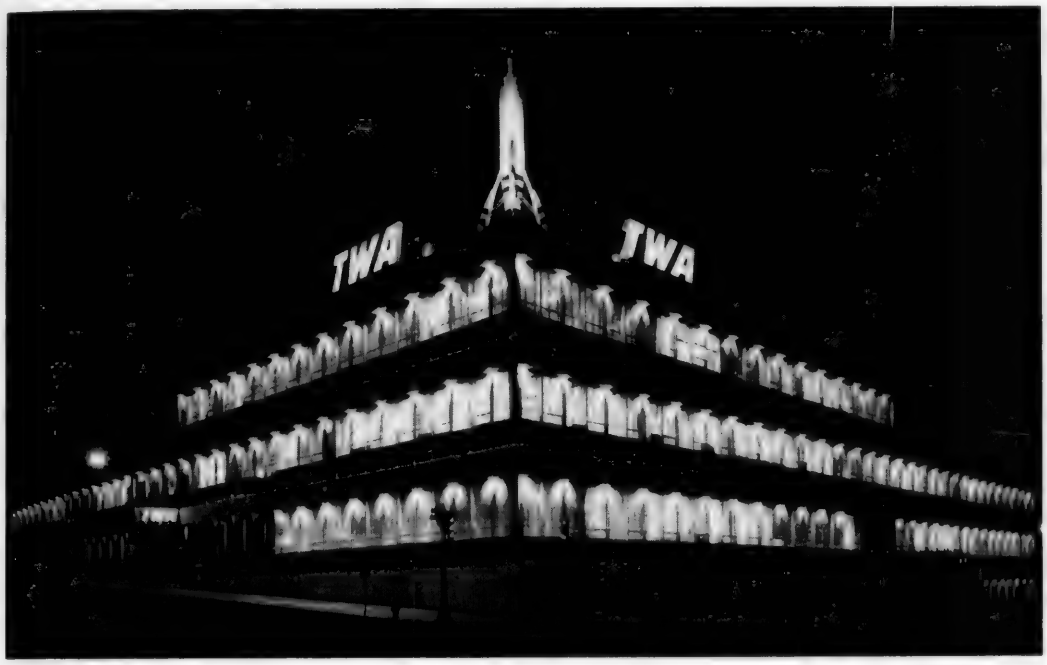
ROBERT SELINGER *is vice president of Oppenheimer Industries, Inc., the Realtor firm which negotiated this interesting new building.*



Spotlighted windows and a floodlighted rocket ship on the rooftop give a sparkling nighttime appearance to Trans World Airlines new office building in midtown Kansas City. The gleaming expanse of plate glass exterior is vigorously slashed with bold red and white panels throughout the three-story structure which houses 700 employees.

ceive only a net rent check and have the tenant take care of everything else.

Since time was of the essence, because Trans World Airlines required occupancy by May 1956, an unusual type of service agreement was entered into between Trans World Airlines and our firm. Our management fee was not to be based upon a fixed percentage of the rent, nor the amount of units, nor the amount of space, but upon a savings clause based upon the overall operation of the premises which included the following:

1. We were to furnish complete building management and maintenance service for Trans World Airlines, which included, without limitation, janitor service and supplies, window cleaning, interior and exterior maintenance, maintenance of all lighting fixtures including the replacement of tubes, bulbs; snow and ice removal from sidewalks and driveways; heat, water, air conditioning, electricity for air conditioning and lighting, and elevator operation and maintenance.

2. Pay all real estate taxes.

3. Provide fire and extended coverage insurance.

4. All these services were to be furnished to Trans World Airlines' entire satisfaction, recognizing that it is their desire that the premises be maintained in a neat, orderly and first-class condition at all times.

A budget was agreed upon by both parties to cover these costs. We were allowed to deduct a fee, to cover home office overhead, from this budget. (*Continued page 265*).

What can a modern operatorless elevator system do in the handling of traffic in a major building? What are the guideposts to intelligent purchase of a system of this type? And above all, is there a practical way to evaluate the different bids received when the project is one of modernizing a present system? This article, by an expert in the field, furnishes answers to these basic questions.

THE OPERATORLESS ELEVATOR COMES OF AGE

by Frank O. Zimmermann

IN AN ARTICLE published in the JOURNAL of Summer 1953, under the title "What the Elevator Industry Has to Offer," the history of modern elevators was covered, culminating in a description of the operatorless elevator system. At that time, although about 80 per cent of the elevator systems being sold for major buildings were arranged for operatorless control, relatively few buildings were operating their elevators unattended.

At present, it is safe to say that every elevator control now being built for elevator systems in major buildings, either new or modernization, is arranged for, if not designed around, the use of unattended elevators. Further, the demand for this product in 1956 was two to three times greater than in any previous year.

Building owners and operators have come to realize that the operatorless elevator is acceptable to tenants. In addition, it offers the advantage of modernization that pays for itself even though building income may not be increased. It is quite common for the entire modernization cost of elevators in a major office building in a major city to pay for itself in about seven years. In buildings where services are required over a longer period of time, this saving has been raised to the point where the cost was amortized in as little as from three to five years. Of course, in hotels this amortization can reasonably be expected even with a lower operator's salary. It might be interesting to note that these savings still allow for lobby attendants.

Imagine a bank of two or more elevators in a busy building requiring only the turn of a single key or the flick of a single switch to start them on completely automatic operation. The system will start itself in response to incoming traffic and change as traffic demand changes, providing the most efficient method of operation for the six or seven traffic requirements of any busy building. When the elevators are not needed, the system shuts itself off only to return automatically to operation at the beginning of the next business day. Remember that this must be done with a high degree of comfort and courtesy, as well as continuity of

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service equivalent to the best manual system in operation in the highest grade building.

To some, this may seem like pure fancy; to others, it may sound so complicated and fraught with trouble as to be unworkable—that is, for long periods of time. Even ten years ago, many people in our own industry did not feel it was possible. Today it is an accomplished fact, and to settle these doubts let us take a typical business day in any major office building and see what the elevators do (this is a Westinghouse system, others are similar).

It is 7:45 on Monday morning. In the bank of six elevators, all of the generators are shut down and all of the doors are closed except one. This is the "Next Car," its doors are open and lights lit to welcome the first passenger. All other cars are at the ground floor with their doors closed and lights out.

The first passenger enters the waiting elevator and presses the button for the floor desired. The generator starts, the doors close and the elevator proceeds to his floor. The car then returns to the ground floor, awaiting the next passenger. Meanwhile, two or three people have come in, they step into this elevator, register their desired floors; the doors close after a predetermined time which is set to permit additional passengers to enter the car, and the car leaves in response to these calls. But this time it takes a little longer to return to the ground floor.

Meanwhile, other passengers enter the ground-floor lobby. Since no car is available, they register their desire for service on the ground-floor push button. This causes the generator of the next car to start and the doors open, the passengers enter the car, register the floors to which they desire to go, and this car proceeds as did the other. Should these two cars be sufficient to handle the traffic during the next few minutes, or for that matter, hours, they will be the only ones running.

Glossary of Terms

UP-PEAK: Morning in-rush, very little if any down-traffic; the bulk up and off the main floor.

OFF-PEAK: Normal condition is a fairly even flow of traffic in both directions, becoming heavier-down at coffee hours and heavier-up at close of coffee hours.

HEAVY-DOWN: A condition where up-traffic is to be expected, yet total traffic is predominantly down.

DOWN-PEAK: Virtually no up-traffic; all traffic down and out at the 1st floor.

OFF-HOURS: The condition at closing time and through holidays and Sundays, with very little traffic except occasional late workers and cleaning people.

Note that door-open time is variable, usually from 3 to 7 seconds at intermediate floors; intervals being set normally from 20 to 35 seconds. variable up to 45 or 50 seconds depending upon building conditions.

MORNING UP-PEAK

Soon, however, both cars become so busy that neither one is available to take passengers at the ground floor when they desire service, and so a third car starts up. At this time, traffic has become so heavy that the number of up-stops compared to total stops indicates that an up-peak condition is starting, which causes all cars to become available for up-peak service.

In up-peak service, the cars are dispatched from the ground floor at intervals or as soon as a car is loaded. If a loaded car leaves in advance of its preset interval, the interval of other cars is advanced so that the next passengers will have no longer to wait than the preset time. (Note: Interval is set the number of seconds that the doors

are allowed to remain open at the ground floor and at the top floor, to allow passengers to enter the car. It is set at a value long enough to allow the car to load comfortably and have another car available at the ground floor for the next passengers desiring up-service.) In up-peak, the cars do not travel to the top of the building. They travel only to the highest call registered, either from the car or from the corridor, permitting the cars to make faster round trips and carry a heavier load of up traffic.

NORMAL OFF-PEAK

Soon the up-peak condition passes, the cars no longer leave the ground floor filled and the tendency for elevator demand in the down direction picks up. This causes the system to transfer to off-peak service. Off-peak service is designed to provide time dispatching from the bottom terminal and the upper terminal—that is, cars leave the ground floor at variable intervals depending on the number of cars available, and travel to the top floor where they remain for a similar interval before returning. In traveling each direction, they pick up and discharge passengers. Should a sudden surge of traffic develop so that an up-traveling car does not reach the upper terminal by the time its interval has expired, that car will be automatically reversed at the highest call to force it to make up lost time. Should the cars make a faster trip in either direction and there be an ample demand for service, indicating medium traffic in numbers of people and stops, the cars will be dispatched earlier from the ground floor and from the top floor. Thus they will give the best possible service in line with traffic demand.

Should traffic demand prove light, there being so few stops recorded on the system as to render useless trips, the system will automatically be slowed down.

COFFEE BREAK: HEAVY-DOWN

This will continue until mid-morning when the people working in the building, having removed their hats and coats and opened their morning mail, reach the time of the coffee break. With this exodus to the coffee or lunch rooms on the lower floors, the down-traffic becomes suddenly heavier. The cars will then make fast-up-trips, giving a greater amount of their round-trip time to the down direction, traveling at closer intervals to give better down service.

CLOSE OF COFFEE BREAK: HEAVY-UP

Similarly, at the close of the coffee break, more up-traffic will be required. Cars making rapid down-trips will have more time available and be spaced to give better service in the up-direction. Seldom have we ever found either of these conditions to warrant more than this requirement, since even during coffee breaks there is an appreciable amount of reverse direction traffic. After this period, the cars will then resume their balanced off-peak setting which will continue until about noon.

NOON: HEAVY-DOWN

At noon in most buildings, while traffic is appreciably down, there are always people entering the building, so we do not have a true down-peak condition. The system reverts to a heavy-down condition by measuring the down calls and loads on the whole system with relation to the up-traffic.

When this occurs, and more than one car is available at the ground floor, the cars will receive an instant dispatch, traveling to the highest call and returning to the ground floor. Sometimes the last car available under this condition will allow its doors to remain open for a full interval so that the persons desiring up-traffic may enter this car. As

soon as the second car arrives, even though the dispatching interval has not elapsed, this car will, of course, leave. The reversing at highest call saves a trip to the top terminal and permits a greater service by eliminating this wasted time.

NOON: OFF-PEAK

As soon as this heavier-down demand has subsided, the cars go on off-peak, again dispatching from the ground floor and the top terminal. The return from lunch in a multiple-occupancy building is usually spread over such a period of time as to make it possible to handle this condition with heavier-up service and the automatic highest call reversal after the top interval has expired.

However, in some single-occupancy buildings or buildings with several large tenants and simultaneous lunch hours, a condition of up-peak may develop, in which case the cars revert to up-peak. This is normally followed by a very light service off-peak, building up to a slightly heavier service off-peak, then to the afternoon rest period, giving us again a heavier-down and followed by a heavier-up condition, then off-peak. The system runs thus until the close of the business day.

DOWN-PEAK

Let us assume that we have a multiple-occupancy building but a reasonably consistent quitting time for the tenants in the building,—the worst condition. How is this handled?

At first there are always a number of people who are most anxious to "beat the bell" and get ahead of the rush. These are normally handled by the heavy-down condition described above. However, usually a big bulge of down-traffic develops. At the close of a business day, the demand for service builds to a peak where down calls may be found at every floor. With the normal operation of elevators of the automatic type, they would thus travel to the highest calls, become loaded and by-pass the lower floors.

The only way to prevent the lower floors from being missed entirely until the upper floors are emptied, is to assign elevators to this lower floor service. The first step is to study the building and arrive at a point in the building which is called a "load center." This is the point at which demand for service above the load center is about equal to demand for service below in relation to the number of cars assigned.

To simplify this, perhaps we had better say that we try to assign the same number of persons per car to the upper zone and the lower zone. However, assignment must reflect the necessity of express travel and up-traffic, creating a longer round trip. If a given condition requires that there should be three cars in the upper zone and two in the lower zone, the load center would be lower; if the reverse were true, the load center would be higher.

Now, this is how the system works:

Down calls are counted in two zones. As soon as the upper and lower zones develop a sufficient number of down calls, the system is divided, assigning part of the bank to the lower floors and part of the bank to the upper floors of the building. The lower floor cars normally reverse at the highest call in the low zone and the high zone cars normally reverse at the highest call in the upper floors of the building. Each then returns to the ground floor when the demand for traffic is evenly divided.

Let us say, however, that the low zone, after this is once started, has a momentary lull in traffic, the system senses this by the number of calls in the low zone and permits a low zone car to go into the high zone,

responding to calls in both zones. As soon as demand is sufficient, the cars are again called back into the low zone.

Similarly, suppose there is a bulge in traffic in the low zone. This is registered by a by-pass of the low zone car, causing the next descending high zone car, and all succeeding cars while this condition exists, to respond to calls in the low zone, if there is space available. Thus, you can see we are robbing some of the service from the upper floors of the building and giving it to the low floors by this method. Likewise, if the service required of the high zone cars in the high zone is low, these cars are available to stop in the low zone.

The ideal which we are trying to accomplish is an even passenger wait for the entire building.

Suppose the lower floor in each zone is missed because the cars get filled up at the top of each zone. Such calls are timed, and should the time exceed a predetermined value in either zone, the cars in that zone are further split. They then favor the lower section of that zone by reversing a car at an intermediate point or below this intermediate point if a call does not exist there. This situation could happen in either zone or in both zones simultaneously and the system would operate. During this down-peak, the high zone cars are normally assigned to handle the occasional up-traffic which may exist.

NIGHT AND HOLIDAY TRAFFIC

Further, this system does not hold the load center division when the latter is not needed; as soon as the down-peak requirement has passed, the system will revert to off-peak service to take the final stragglers out of the building. Finally, service will fall below a predetermined number of stops per minute, which will cause cars to shut down, and when there are no calls on the system beyond a preset time, the system will shut itself down. All cars remain at the ground floor with the last car to arrive becoming the next car available for service. Should a night call come in, this car will respond to this call and again return to the ground floor, and the generator shut down after the preset time.

Thus, we have covered the first day of the week in elevator service in this typical office building. The system is ever-watchful, ready to start again the next day, or ready to take any traffic which should develop during the evening, night or Sunday. There are no clocks to set, no switches to turn. Should a holiday occur in the middle of the week, the system will operate the same as it did on Sunday.

PASSENGER COMFORT AND COURTESY

We have described above the various methods of operation and the various peaks during the day. Now what about passenger comfort and courtesy? Early in the development of operatorless elevators, it was discovered that passengers became impatient with the interval of waiting at the ground floor and top floor. Yet, such an interval was essential to permit cars to get an adequate load and to maintain reasonable spacing of the cars in the hoistway. People would enter the car, register a call, and feeling that something was wrong, would step out.

To avoid this misunderstanding and annoyance we placed a sign in the car which would illuminate upon registering of the first call, saying "This Car Next." The sign was very effective in satisfying passengers that they had entered the correct car. However, occasionally when one car was loading, a second car would come to the ground floor. While the doors were open to dis-

charge passengers, some passenger, paying no attention to the light over the door of the proper car, would crowd through. The doors would close and when he registered his call nothing would happen except that he would be locked in the car.

To correct this situation, which could be terrifying to some people, we placed another sign in the car saying "Another Car Next," illuminating as soon as the button is pushed. Further, we opened the car door and hoistway doors so that this passenger was free to leave the car if he should desire. However, should this car become fully loaded, it will be dispatched at once.

From the standpoint of door courtesy, a new system is available which will not allow the doors to close while someone is entering or leaving the car. Should the doors start closing when a person enters, they will reopen. Further, this system is used to eliminate the long waits which were first necessary in this system to allow passengers sufficient time to enter the car at the intermediate floors. Now the doors are set so that if the car lands in response to a car call, the doors close within three-fourths of a second after the last person has left. However, to avoid the doors closing in the face of someone desiring to enter when a corridor call is registered, the time is extended, usually to a minimum of two seconds.

In addition, this system recognizes when a car is crowded, and extends the time for the doors to close after one passenger leaves, permitting a second passenger to leave should he so desire.

EMERGENCY FEATURES

Our engineers have even developed a system which goes into operation in the event of an overload failure of the elevator or overspeeding. Formerly, these two annoyances would cause the passengers to be locked in the car between floors. Today a car which is affected by an overload device or an overspeed device will run at slow speed into the next floor, the doors will open, permitting the passengers to leave.

At the very beginning, our engineers were concerned with two possible failures of the system which could prevent the cars from running. A blown fuse in the main push button circuit is an example of the first possible failure. The new operatorless system, recognizing the fact that without human attention there would be nothing to start the cars should corridor calls exist, first arranged to transfer the system on to separate source of supply in the case of a fuse failure. Or if something more involved existed, each car would be assigned certain floors to stop on each round trip, thus assuring service to all floors.

The second of these failures would be that of the dispatcher to select or dispatch cars away from the floor. An auxiliary dispatcher is provided to check the main dispatching timer. Should the main dispatcher fail, the first auxiliary dispatcher takes over and dispatches the car. If the latter also fails to operate, an emergency timer comes into action, dispatching the cars instantly from the top and bottom floors. In both these conditions, a signal light is lit both in the starter station and in the engineer's office to inform them that the cars are running on emergency service and should be corrected.

Have any of you suffered the experience of having the power breaker for all the elevators fail? Under present manual systems, you would carefully have to shut off all motor generator sets, starting up two at a time. Under the new automatic system, no more than two or three sets could start at a time, thus insuring that the breaker would handle no more load than would permit it to operate serviceably without failure.

AN ELEVATOR THAT TALKS

Today there is in service an electronic voice arrangement carrying a series of messages advising the waiting passenger that the car is going up, going down, informing the passenger to stand free of the door, even advising him to register his call should he have failed to do so. Several of these installations have been made or are in the process of being made, and their impact upon the field will soon be known.

What about the playful person who registers all the calls on the system and then steps out of the car, allowing it to make many useless stops? This, too, can be eliminated. If required, we can cancel all car calls if no one is in the car.

What about the more prevalent conditions in a building? First, the registering of an up-call, causing an up-car to stop during down-peak, loading it at a lower floor and reversing, robbing service from the upper floors of the building. This may be corrected by not permitting up-stops in response to corridor calls during the down-peak, which is of relatively short duration, or assigning only one or more cars, to answer these calls.

What about the man who, during down-peak, sends a car back up to his friends by registering a car call? This is corrected by preventing a car call being registered until the car doors are closed at the ground floor. Thus this person, in effect, becomes an operator and there are not many people who would do this even for a friend. They all seem to want to get their bus first.

It is clear from the above that we have come across many problems in the development of this product and many have already been solved. Others, as they develop, will also be solved, so that within the limits of the amount of equipment furnished—that is, number of elevators—the operatorless system of today with traffic control is truly automatic in every sense of the word. It is a turn-key job requiring only the registering of calls and traffic to change its pattern of operation. Systems of the type described above are in service in the busiest buildings, attesting full well to their efficiency and reliability.

STUDY OF OPERATORLESS ELEVATOR PURCHASE

We have described an automatic elevator system running in a modern office building primarily to give an idea of how it works. To give some idea further of the situations involved, so that a manager may better understand what he is buying when considering operatorless elevator systems, let us now go then to the question of purchase.

How can one be sure he is getting all of the desired features and that the specification of the product he is buying will do the job? What are the signposts? How can we analyze bids?

The purchase of a vertical transportation system for any building should be based on the most practical possible considerations. Questions of how to determine the practicability of a system, while somewhat involved and detailed, are readily understandable to the average building owner and manager. He must only carry in mind that essentially he is buying no more nor less than a conveying system which is required to deliver a certain number of persons over a certain number of floors in a given period of time. If this fundamental concept is kept constantly in mind in analyzing bids and reports of competing companies, the question of relative value of the proposals may be reasonably well determined and a correct selection made.

There are, of course, other considera-

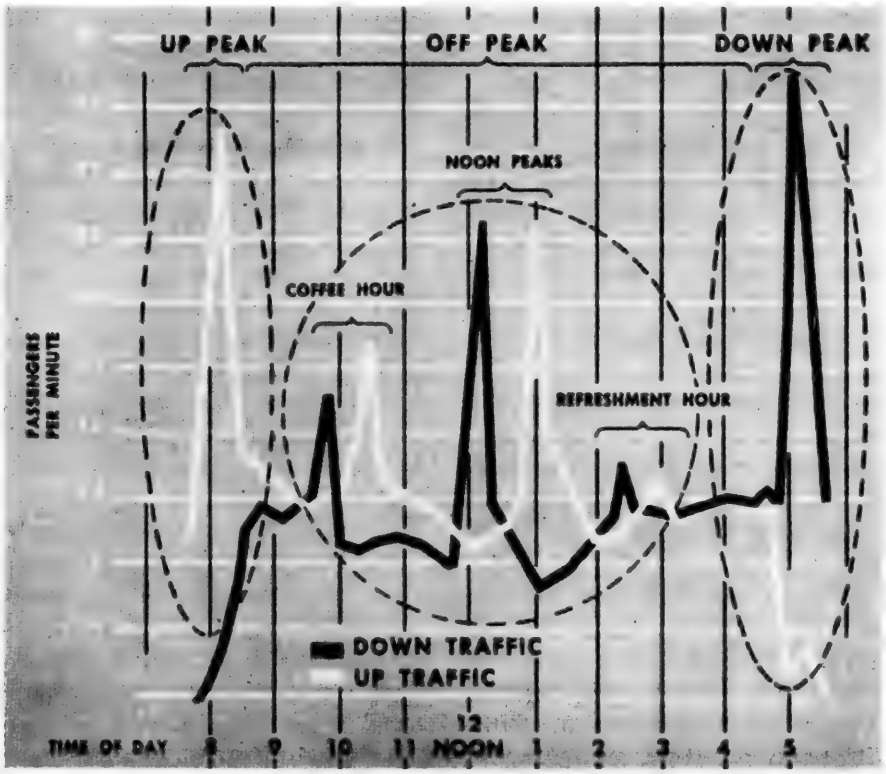


Fig. 1—It has been found that there are generally 5-minute peaks of traffic demand which, if satisfied, will give a satisfactory elevator system as to number, speed and capacity of elevators.

tions which may cause some deviation from the prime object of purchase for use. These can, and of course always will, influence purchase. On the other hand, their relative importance can only be determined in its true perspective after the basic decisions as to the solution of a traffic problem are first viewed from a practical standpoint.

The prime practical consideration being the handling of traffic, let us see what requirements can be expected in these types of buildings: multiple-occupancy general office buildings, professional buildings, single-occupancy buildings, medical buildings and hotels.

It has been found that in each of these types, there are generally five-minute peaks of traffic demand (Fig. 1) which, if satisfied, will give a satisfactory elevator system as to the number, speed and capacity of elevators. Outside of these peaks, the only other important traffic problem is the length of time people must wait for an elevator after the button is pushed at an intermediate floor. This is a function of interval of service, or *interval* as it is commonly known in elevator parlance. It is this problem that causes most of the complaints of building occupants.

In manually-controlled elevators, the operator may bear the brunt of these complaints. In an operatorless system you, as managers and owners, can expect a greater

share of complaints if waiting becomes excessive. Interval may be defined as the average time of departure between elevators at the top and bottom terminals. The interval in any building now operating can be most easily determined by measuring the average time of several successive departures of cars.

In calculating interval on any system, the elevator traffic engineer totals the round trip of an elevator of given speed and capacity, with a predicted number of stops and passengers, which are deemed to be average for the period he is studying. His calculations include acceleration, deceleration, door opening and closing times, passenger times—or in the case of an automatic elevator, the time the doors must be allowed to remain open to allow passengers to enter at each stop—as well as running time and time lost in coordination of elevators. This is divided by the number of cars to be used and becomes the interval. The lowest practical interval in any building during peaks is the time it takes to load a car, which amounts from 0.8 of a second to 1.1 seconds per passenger depending upon the size of entrance, whether one or more passengers can pass through at the same time.

For some capacity of elevators, the interval can be as low as 15 seconds; however, it is generally considered good practice and excellent service if a car leaves the ground floor every 20 to 25 seconds; good service from 25 to 30 seconds; fair service from 30 to 35 seconds. In some cases, acceptable service is obtained with an interval from 35 to 40 seconds, depending upon location of the building and type of tenant. Poor service ranges from 40 to 45 seconds, and becomes intolerable if it is in excess of 60 seconds.

These times may seem to be quite low; on the other hand, remember that a person waiting for an elevator is normally in a confined area, maybe alone, and therefore, impatient. Also, studies indicate that it is very possible, under certain conditions of traffic, that people on an intermediate floor can wait as much as double the interval, having just missed one car and the second car passing fully loaded. Many tests have been made with people in a room, allowing them to wait 15 seconds, then asking them how much time they thought had elapsed. Even in a group in silence, it is astonishing how long 15 seconds can seem. The average tenant will complain if he waits for a minute or longer.

AVERAGE OCCUPANCY IN BUILDINGS

How do you determine building population? In determining the population for a proposed office building, this is always a "gestimate." It is surprising, however, how close, or at least how conservatively safe these figures based on areas and density are With the increased cost of major office building rentals, office equipment manufacturers have now developed a module form of arrangement. This arrangement permits ample working and aisle space with as little as 80 square feet per worker in lower floors of a single-occupancy building or in single floors to be occupied by major tenants.

The possible density may be, of course, as much as twice this value for any given area, but allowing for aisle space, washrooms, files and the like, the 80 square feet is normally the heaviest density that could be expected. The density may be 90 square feet per person on the lower floors of multiple-tenant buildings in congested areas of large cities. An average multiple-occupancy building will have a population of one person to every 100 square feet, ranging on up to as high as 150 square feet

per person, or higher in executive areas.

In 1953, a published study of 352 buildings showed that they averaged 117.7 sq. feet per person. This varied from a low of 94.3 to a high of 128.7 sq. feet per person.

In a medical building recently studied, with 170,000 square feet of rentable area and 400 tenants, the population was 1250 (136 square feet per person).

In a professional building of 210,000 square feet of rentable area, there were 250 tenants with a population of 2,200 (95½ square feet per person).

In a hotel, during the peak day's occupancy, there is a normal anticipation of from 1.25 persons per room available for rental to as high as 1.4 to 1.5 persons per room where conventions are a specialty.

POPULATION MOVEMENT EXAMPLES

In an office building of the general-purpose type, we have found it fairly safe to assume that there may be six or seven passenger movements for every person employed. This assumes a certain number of movements besides loading and unloading the building, and lunch, to allow for coffee breaks, and for visitors to the building.

In the medical building, while the population density is essentially quite low, we found that there were four and a half times as much as the tenant population entering the building, with a total of passenger movement about 18 times the tenant population. Ten per cent of this traffic was inter-floor traffic. The building is 95 per cent medical, and we are told that depending upon the tenant involved (medical, dental, optometry office), there can be anywhere from eight to ten patients per day to as high as 50 to 60 patients per day.

In the peak hours, morning, noon and night, there were 3,362 passenger movements in the professional building. This was one and a half times the tenant population.

In a hotel the public space must be considered. By this we mean banquet rooms, dining rooms, clubs and the like which could exist in the upper floors of the building and which could materially affect traffic demands. In one hotel now being studied, banquet rooms on the top floor can provide traffic for a down-peak from this point almost equal to the total population of the hotel when completely filled. On an average banquet day, 75 per cent of total population can be expected. In hotels, also, depending upon the convention use of the hotel or distribution of public space, serious consideration must be given to possible inter-floor traffic.

The next consideration, and one of very real importance, is to determine the requirements of transportation at the time of maximum population movement. This depends upon many factors. Again, however, these factors are neither difficult to see nor especially hard to understand. In a general office building with diversified tenants, it is safe to assume that people do not quit at the same time. An adequate vertical transportation system should take care of 13 to 15 per cent of the population in five minutes. Many studies over a long period of years have determined that this is a fairly accurate and safe figure to use, inasmuch as it represents normally the highest peak that you can expect in a building of this type. Quitting time in the evening is when the peak usually occurs.

In a single-occupancy building, or where single floors are rented or multiple floors rented to a single tenant, consideration must be given to the problem of whether or not there can be a staggering of hours. Today it may be necessary to move 25 to 30 per cent of the people quitting at the same

time in five minutes. It's conceivable that in some buildings this could represent this large percentage of the entire population.

In each of the above, there may be a two-way traffic problem at noon.

In a medical building, it is usually safe to assume that the real traffic problem will not develop before noon. At this time, however, it will be heavy, it will be two-way and could very well involve a considerable amount of inter-floor traffic to various laboratories, x-ray rooms and the pharmacy. All of these must be evaluated. The safe approach here is to arrive at two or three predicted values of passenger movement and study each one separately to determine which more nearly indicates a condition with which you could live. This should be checked with satisfaction of the final job to be purchased. For a new building, if due consideration is given to the traffic of similar buildings, the same results can be anticipated. This can be followed by a study of these buildings and their interval can be verified by talking with the management of the building and perhaps watching a heavy traffic period.

It is the writer's opinion that if adequate traffic handling capacity is not purchased, any other consideration of purchase cannot make the system adequate. It is true that this determination, while somewhat difficult, is at least reasonable or can be made reasonable and understandable in any building seriously studied.

EFFECT OF BUILDING HEIGHT

A common fallacy in the consideration of elevator purchases is that if a building having 100,000 square feet of rentable area is served adequately by three cars, any building of 100,000 square feet of rentable area may be served adequately by three cars, providing it is generally of the same type.

Very often people lose sight of the fact that the first building may have only five floors to serve and the second might have ten. The jump in vertical height might mean that elevators of higher speed are required of the same capacity, or a greater number of elevators of smaller carrying capacity. Thus, the number of floors in the building also has a very great effect upon elevator application. This is usually adequately determined by the buyer if he analyzes the full requirements of the two basic considerations mentioned above—population movement requirements and interval.

A GUIDE TO INTERVAL AND HANDLING CAPACITY

To give a rough approximation of service and carrying capacity of elevators which might commonly be found in the average experience in a similar building.

In hotels, the heavy traffic will occur usually between the hours of five and six-thirty p.m., at which time as many as 75 per cent of the occupants may be registered. In addition, and worse still, as high as 75 per cent of the people at conventions are going to their rooms after meetings, and then return to the ground floor. The safe average figure here to use is about 125 per cent of the potential room population moving in both directions in one and a half hours, with the average peak about 25 per cent over this value.

TO MAKE EXISTING BUILDING COUNT

In an existing building, a complete study requires a count of on and off passengers in each car at each floor, as well as a ground floor count. In some cases, this may be justified, but generally all that is required is a ground floor count of on and off traffic for all cars, including the number of times the cars leave the ground floor.

BUILDING XYZ Building DATE 3/16/57
TIME START 10:30 AM SHEET NO. 12
TIME FINISH 8:15 PM ELEVATOR NO. 2

FLOOR	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	
B		X		X		X		X		X		X	
1	8		3		4		2		7		1		
2													
3							1		2				
4		2		1			2			3	1		
5	1				3		1						
6										2			
7		3		2	1	4		4		1		2	
8		2											
9								1		2	1		
10	1	2				2				1			
11		1				2		1				1	
12	X		X		X		X		X		X		
12		X		X		X		X		X		X	
11					1		1				1		
10								1	3				
9	2		1		1		1						
8			1								1		
7	2				5		2		2		3		
6			1										
5	1									3	1		
4		1			2		1				1		
3			1								1		
2										1			
1		4		4		9		4		1		7	
B	X		X		X		X		X		X	1	

Fig. 2—This simple form will help to take a floor count in a building, which establishes prevailing traffic patterns.

A concurrent count of one typical car to determine approximate distribution of passengers and inter-floor traffic is also important. These counts are recorded in five- or 15-minute intervals. The floor count is taken by the use of a simple form showing all floors up and down, with on and off passengers in columns, which are filled in by a person riding the cars. Further, this count need not be carried all day. A little study (Fig. 2) will indicate the busiest periods of the day, both at peaks and at noon or some other period which causes the high degree of elevator stops per round trip and/or high passenger movement. In an existing building, the question of determining the heaviest five-minute peak and interval requirements will usually be found to be well worth the effort.

Four charts and a table are shown here, covering the typical capacities and speeds which may be found in the average office building and hotel. (Fig. 3) & (Fig. 4). The use of these charts, together with the table, will give some idea of the round trip times for the more common capacities and speeds in use today. Chart D includes the round-trip time to be added to any of the other three charts where an express one is included in the elevator system.

Take as an example in Chart B, a car traveling at 700 feet per minute, moving from 1 to 11 to 21. From Chart B, the round-trip time for the local floors served is 107 seconds; for the ten express floors, you must add to this 26 seconds (Chart D) making a total round trip time of 133 seconds. From Table I, we read that we can carry 16 passengers on a 3,000-lb. car; and in this particular building we would expect each elevator to deliver 16 people during the up-peak or down-peak heaviest average load every 133 seconds. With six cars in the bank, we would have an interval of 22.2 seconds, or we would deliver during the heaviest peak a total of 16 people for every 22.2 seconds.

A word of caution, however, these curves and this table are to be used only as a rough check. They are based upon the averages of many buildings, and while close, do not necessarily apply to any one building. Further, the traffic in your building may be affected by special loading conditions at floors. These must be evaluated separately in an individual traffic study. However, this information will serve to help you in checking this traffic study.

SOME COMMON PROBLEMS

The length of a single elevator bank, if all the cars are strung out in one line, offers further problems which you must consider and for which an adequate explanation of service must be provided in order for you to judge your elevator bids properly.

The size and shape of a given elevator car may have a material effect upon its traffic handling ability. Ideally, of course, would be an elevator not more than two persons deep, with doors to permit two persons to leave at a time, or three if possible. This extreme is almost never available, or for that matter, neither is it wise as a building arrangement. On the other hand, if cars are deep and narrow, you can anticipate the possibility of trouble in handling traffic.

Due allowance, either through signals or through an allowance in time for service, should be indicated in any study of a building of this type. How good or bad the conditions may be can be observed by going to buildings having elevators of odd shapes and watching the specific problem during busy periods.

The elevator industry has developed standard sizes and shapes of elevators and standard door openings which offer the most efficient arrangement for each type of ap-

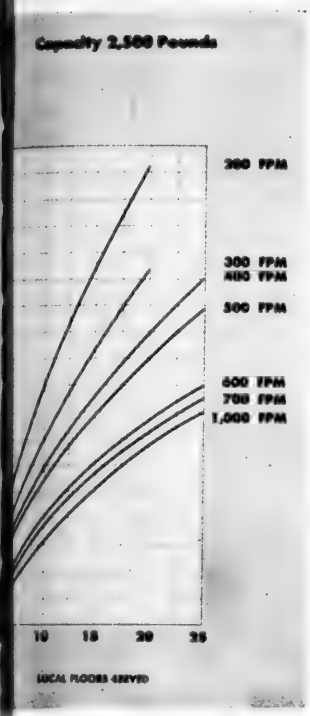


CHART A

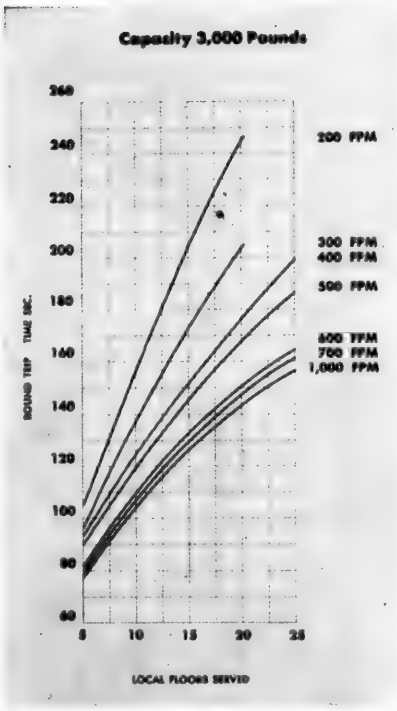


CHART B

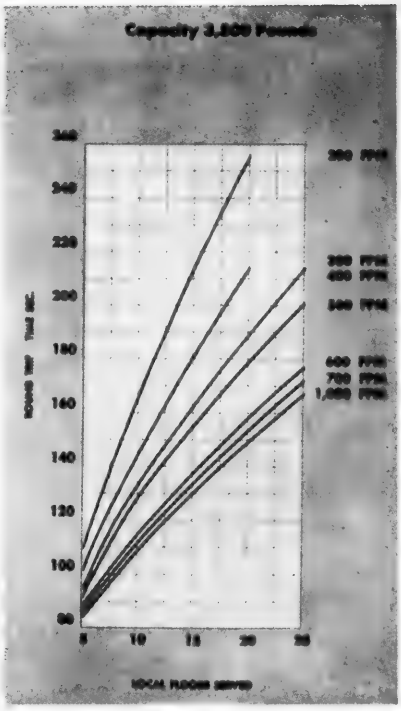


CHART C

Fig. 3—These four charts, with Table I, can be used to give a rough approximation of service and carrying capacity of elevators which might commonly be found in the average building.

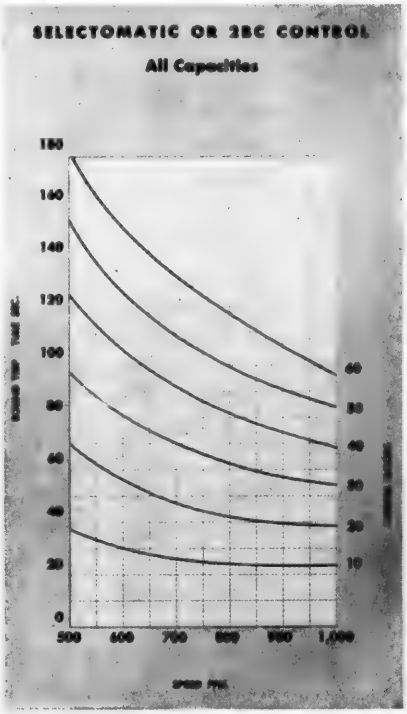


CHART D

Fig. 4—TABLE I

ELEVATOR CAPACITY (Pounds)	PASSENGER CAPACITY	PASSENGERS PER TRIP (Normal Peak)
2,500	16	13
3,000	19	16
3,500	22	18

plication. These standards should be followed in all new buildings and in modernizations of existing elevators where possible within the confines of existing hoistways.

It has been generally found that to handle more than 2,000 people in a single elevator bank is unworkable. Also, when the number of elevators in a single bank is in excess of eight, even with the elevators face to face, the system is inefficient.

Such a simple thing as placement of the push buttons for corridor call has been studied, and most of the people today who have purchased and are using operatorless elevators know the importance of location. They agree it is usually wise to have only one button riser and have it placed at the center of the elevator bank, or as close to the center as is possible where the elevators are in a line. People tend to congregate at the button, and at the center they are most convenient for movement to any car in the bank.

These are the signposts for elevator traffic requirements in your building. If any bidder cannot reasonably or adequately demonstrate his understanding of your traffic problem and how his equipment will solve this problem, it is possible that though he may be completely sincere, he could also be completely wrong. You may be faced with an inadequate system.

How to Judge Elevator Modernization Bids

The basic considerations of traffic handling and the understanding of the traffic problem come first in any purchase of modern operatorless elevators, but this is not the sole problem with which the buyer is faced, particularly when modernization is involved.

Often there are wide variations in final bid prices between various bidding companies. In this case the building manager or owner, architect or engineer, is faced with what may seem the insurmountable problem of analyzing each bid, reducing it to some common considerations so that he may make the best decision regarding the equality of the bids. Many managers have been faced with price spreads of 10, 20, 30 or more per cent between bidders on modernization. Inasmuch as these jobs are quite difficult to specify, the buyer is caught in a dilemma.

First, what are these variations which can develop in modernization purchase? In most cases, in a modernization bid, variations in bid pricing may soon be reduced to certain common factors if the following questions are adequately answered:

1. How much of the existing equipment in the elevator penthouse and hoistway is being retained?

2. How much of this equipment is being repaired or rehabilitated?

3. What kind of door operation is specified in each case, and what speed of door operator? By this we mean, are the doors to open from the center or the side? What width of opening is provided by each bidder? (Note: this can have a very real effect on traffic, inasmuch as any opening under four feet in width in a normal building will invite only one passenger at a time to pass through, while openings over four feet are conducive to two passengers moving through the opening at the same time.)

4. What kind of signal equipment is included in the car, in the ground floor lobby

	Company A	*Company B*	*Company C*
Capacity & Speed Present 2500# at 600 f. p. m.	Present	Present	2500# with speed raised to 700 f.p.m.
Gearless Machine Motor	Re-use; no repair	Re-use; reconnect fields; new brushes & brushholders	Re-use; reconnect fields; new brushes & brush-holders; clean & repair
Brakes	Re-use as is	Re-use & rebuild	Re-use; provide new contacts, coil sleeves & lining
Motor Generator Sets	Re-use as is	Re-use; provide new field coils, brushes; clean, dip & bake	New sets
Basic Control & Landing Device	Re-use present; provide new contacts & coils as required	New	New
Door Opening Equipment	New—2 ft. per second opening	New—2½ ft. per second opening	New—2½ ft. per second opening
Terminal & Final Limit Slow-Down Switch	Re-use present; new contacts as required	New	New
Safety Device, Sling & Platform	Re-use; add crosshead load weighing device	Re-use; except new platform, load weighing device, modify safeties; sound isolation for platform	New; self resetting safety; sound isolation, platform
Governors	Re-use present	Re-use present	New

Fig. 5—When considering modernization bids, be sure to make a comparative chart, showing exactly what each bidder proposes to do. This will help in making the right final decision.

and at the intermediate floors? Also, what kind of a communication system—telephone or inter-communication—is provided?

5. What value of design of cabs are to be furnished by each bidder, and does each bidder include or leave out replacement of existing door panels, or the change of entrances from side opening to center opening, which is sometimes worth while on the sheer traffic handling ability of the system?

6. Just how will each bidder's equipment fit in the building? What are space requirements? Will I have to provide additional space? Will the installation of this equipment entail a lot of additional building work?

While this last question is not reflected in the elevator bid itself, it is one that can cause a real headache to the average owner and manager, involving appreciable ex-

pense, unless consideration is given to equipment arrangement for the most economical possible installation in line with the requirements of the job.

There is really only one way in which these questions may be answered adequately and evaluated in analyzing the final bid of any competitor, and that is by the use of a chart analysis like the partial one shown in Fig. 5. List on the left-hand side all the important items of existing apparatus, such as machines, motors, brakes, guide rails, slings, platforms, safeties, etc., and tabulate under each bidder's column briefly what he proposes to do in each of these instances. Re-use without rehabilitation, of course, should be explained by the bidder in question.

Included in this list should also be the speed and type of door operator to be used. While this may seem a small item, remember that in the average office building elevator, or hotel elevator, the car will make approximately 2,000 stops per day and every second lost at each opening must be multiplied by 2,000. Consider whether or not the old sills and door panels are to be retained, since this may have a very real effect upon the appearance of the completed job.

In the cab specification, care should be exercised, particularly in the choice of material specified for walls, entrance column, lighting, and ventilation. In signals and communication there is a considerable variation in approach between various bidders. These items could have a very real effect upon the acceptance of the final job in your building and upon the ease of use by your tenants.

Bear in mind, we are not intimating that a bidder who retains old equipment is necessarily wrong; we do feel, however, that it is wise to know exactly what each bidder is doing, so that his bid may be properly evaluated.

SUMMARY

In summary, to purchase elevator equipment, first determine the actual traffic requirements—namely the number of people to be carried in the busiest five minutes of the elevator day. Second, learn what the interval of service of the predicted system will be. Third, make a personal check of the service of each bidder's equipment, if possible, by checking the time it takes for an elevator to go from one floor to the next. These will determine the adequacy of service of each bidder.

Once this has been determined, then other considerations such as emergency features, safety features, riding qualities, reliability, door operating performance, even some of the miraculous gadgetry which is being applied, can be weighed. If you follow this pattern, you will at least be sure of the end result of your purchase.

Keep it quiet! is an efficiency-making principle which should be observed in arranging space for all kinds of work situations. Treatment of the finish ceiling is the key. Here's an up-to-the-minute guide to the various materials suitable for soundproofing ceilings—including an acoustical material comparison chart.

SOUND ADVICE ON CEILINGS

by E. S. Graybill

MODERN FACILITIES, not a modern exterior, is the major interest of tenants in renting office space. As many articles in the JOURNAL OF PROPERTY MANAGEMENT have pointed out, modernization can keep an older building fully occupied even at increased rental rates and in spite of stiff competition from newly completed office buildings.

Almost every new office building erected today has, in large part, ceilings of acoustical material. The basic reason is simple. Nearly everybody prefers to work in a quiet place. Clerks and executives alike justify their preference for quiet by increasing production and decreasing errors.

Acoustical ceilings quiet noise by absorbing the energy of sound waves. It's not as complicated as it sounds. Imagine yourself in the middle of an office with a gross of golf balls, and while you're at it, imagine yourself in a suit of armor, because there are rough times ahead. Now fling the golf balls as hard as you can in all directions and watch them bounce. They bounce everywhere; from the floor, from the walls, from the desk tops, from the ceiling. They keep on bouncing for a long, long time.

MR. GRAYBILL *is manager of acoustical sales for the Armstrong Cork Company and has served as president of the Acoustical Materials Association.*

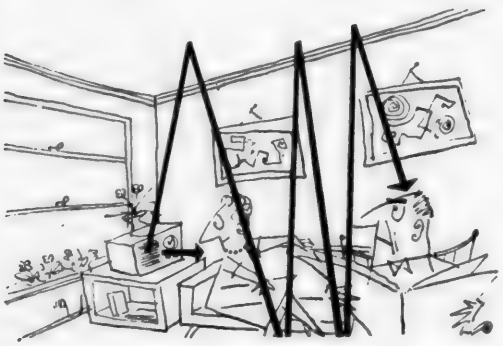
Now pick up a golf ball and hurl it against a soft cushion. Not much bounce at all. That's because the soft cushion absorbed all the energy of the golf ball's speed.

Sound waves and acoustical materials act in very much the same way. The sound waves travel out in all directions and bounce from hard surfaces, as the golf balls did. But when they hit an acoustical ceiling, their energy is absorbed by the fibrous material in the holes or fissures in the tiles. Usually, ceilings are treated because they provide the largest free area in the room.

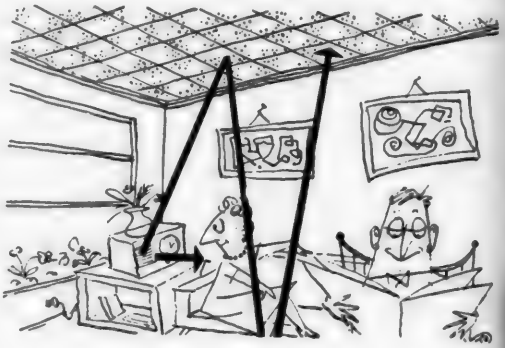
Because it contributes so greatly to comfort and efficiency, sound conditioning, along with air conditioning, lighting and decoration, is one of the major items to consider in modernizing an old building as well as designing new construction. Not all acoustical materials are alike. Some will absorb more sound than others, some have greater moisture-resistance, some are incombustible. Most have distinctive advantages that others do not possess. A comparison of the various materials available should help in deciding which products best fit your needs.

TYPES OF ACOUSTICAL MATERIALS

There are three basic types of acoustical material: cellulose fiber tile, mineral fiber



Sound waves, rebounding from hard surfaces, build up into irritating noises . . .



. . . but when sound strikes an acoustical ceiling, the noise-trapping holes absorb the sound energy.

tile, and panels composed of a mineral wool sound-absorbing pad supported in a metal pan or by a perforated asbestos board.

The cellulose fiber tile, either wood or cane fiber, may be perforated in a regular, straight row pattern, perforated in a random pattern, textured, fissured, or slotted. Cellulose tiles of cork are fissured. Mineral fiber tile may be perforated, fissured or striated—that is, grooved—and are also available with an etched relief design. Another type of mineral fiber tile is surfaced with a patterned plastic membrane. The metal and asbestos board panels may be slotted or perforated.

Generally speaking, the cellulose fiber tile is considered least costly, the mineral fiber tile more handsome, and the metal panels most efficient and durable. However, each situation calls for a thorough appraisal to find the material and system for installing it that will meet requirements at the least necessary cost.

INSTALLATION

Installation methods vary widely. Acoustical tile may be nailed, stapled, screwed, cemented with a special adhesive, or suspended on a metal framework from the floor above. The method chosen for any particular installation depends almost entirely on job conditions, since one method is just about as good as another from the standpoint of final appearance. For instance, if a solid concrete deck is serving as a ceiling, the most economical means of installing an acoustical material will very likely be the adhesive method, in which the tile are fastened directly to the deck with blobs of tenacious acoustic cement.

Let's suppose, as another example, that there are cracked plaster ceilings throughout the building. Instead of spending money to repair or replaster the ceiling, with the expectation of having to do it all over again after a few years, the manager may decide to install a permanent acoustical ceiling. In this case, though, cementing directly to the old ceiling is inadvisable, since the plaster may later fall, carrying the acoustical ceiling with it. The solution here will probably lie in the use of furring strips. Long, straight, wooden strips are attached to the structural framework above, usually by nailing through the plaster, and the acoustical tile are stapled, nailed, screwed or cemented to them, holding the tiles firmly in place.

Mechanical suspension methods (there are several variations) are used to hang the

2

1

There are three basic types of acoustical materials: cellulose fiber tile, mineral fiber tile, and panels having a mineral wool sound-absorbing pad supported in a metal pan. These three photos show the three types in use. (1) Wood fiber tile gives this office high sound absorption at low cost. The white-painted finish reflects 78 per cent of the light that strikes it. (2) A mineral wool ceiling, with fissured pattern, adds distinction to this board room. (3) The metal pan acoustical ceiling gives highest sound absorption. Here it is used in a terminal.

3

Mineral fiber tile also comes in this striated pattern. By alternating the direction of some of the 12 by 12-in. tile, a wide variety of design is possible.

acoustical ceiling from the structural framing at a specified height from the floor. This is the practice particularly where it is desirable to conceal utility lines between the acoustical ceiling and the floor above. Sometimes it's the fastest means for installing certain materials, and it is the only way to apply the metal pan products. Mechanical suspension is frequently the best and most economical way to incorporate many types of modern lighting and air conditioning fixtures into the acoustical ceiling.

Whatever method is decided upon, chances are the acoustical contractor can arrange do to the work with a minimum of annoyance to the tenants. He's often able to eliminate interference with office routine entirely, by working on weekends, or during night hours. For maximum satisfaction, it is important that manufacturer's recommendations for job construction be followed closely and carefully.

EFFICIENCY

Different areas have different efficiency requirements. A private office has less noise to quiet than a busy corridor, while a room full of business machines in constant operation will demand the maximum in sound absorption.

All acoustical materials made by reputable manufacturers quiet noise, of course. They soak up from 50 to 95 per cent of the sound that strikes them, depending on the material, its thickness, method of installation and the frequency range, or relative shrillness, of the sounds produced in the area.

In the normally active business office, even the least effective of these materials is sufficient to maintain a comfortably quiet atmosphere. Where noise is more of a problem, but a less efficient material is preferred for another reason, that material can usually

be obtained in a thickness that will provide a satisfactory degree of quiet; or, wall surfaces as well as the ceilings can be treated to provide a greater sound-absorbing area.

BEAUTY

Frequently, appearance is the deciding factor in selecting a particular acoustical material. This is especially true when the area being considered is under scrutiny from the general public. Such areas as the lobby, elevator bank, or reception desk usually receive preferential treatment.

Beauty in particular is a matter of individual choice. While most people seem to prefer the distinctive beauty of a fissured or striated material, many would rather install the more casual random perforated tile, and some prefer the precise regularity of a straight row of perforations or slots.

Many types of tile lend themselves to customized patterns in parquet, basketweave, random, stripe and panelling effects. Even further individualization may be provided by cutting the tile into rectangles and triangles or combining two or more types or sizes to achieve an infinite variety of designs.

No matter what individual tastes may call for, any well made and carefully installed material will provide a handsome ceiling that contributes to the attractiveness of a new or refurbished interior.

MAINTENANCE

Maintenance of most acoustical materials is a simple matter. They require no more upkeep than ordinary plaster. An occasional wiping with a damp cloth or dusting with a vacuum cleaner is sufficient to keep acoustical ceilings clean for years. While most materials are considered washable, they must not be subjected to heavy quantities of water, which might be absorbed by the fibrous or porous tiles, causing them to expand and buckle. Washing should be restricted to an application of soap suds followed by a rinse with a damp cloth or sponge. The metal pan and the asbestos board materials may be scrubbed with a stiff brush, if care is taken to avoid forcing water into the holes. Stubborn spots on cellulose fiber products can be removed by ordinary wallpaper cleaner or an art gum eraser.

If the ceiling surface has accumulated a layer of grime over the years, most managers prefer to paint the ceiling rather than wash it. Perforated products may be painted almost any number of times without affecting the acoustical efficiency to any noticeable degree. Either the spray or brush method may be used, as long as the paint is sufficiently thin to prevent clogging the sound-absorbing holes.

The fissured materials require somewhat more care in painting, since the paint should not seal the minute, noise-quieting crevices in the tile surface. Spray painting is generally recommended, though the brush method may be used as well.

The more finely textured materials, which often resemble plaster, are the hardest to repaint. Extreme care must be taken to prevent sealing the surface, and loss of some acoustical efficiency is almost inevitable.

FIRE-SAFETY

Building codes, especially in larger metropolitan areas, frequently require incombustible materials in critical areas such as staircases, corridors, entrances and exits. An incombustible material cannot make a building or room completely "fire-safe," but it can act as a safeguard in slowing the spread of flames. The mineral fiber tile and the metal and asbestos board panels are incombustible and may be used in areas where such a material is specified.

Slow-burning materials are sometimes

The fire-safe mineral fiber tile can be matched in pattern with the less expensive wood fiber tile, thus making possible a perfect match between critical and non-critical fire areas.

Sanitation rules in this cafeteria demand an acoustical ceiling that will stand repeated washing. Perforated asbestos board may be scrubbed with a soapy brush and will not absorb water.

suitable in areas where incombustible products are normally used. This permits the installation of the less expensive cellulose materials, which are available with a flame-resistant paint finish. The special paint surface slows the burning action by preventing the flame, for a time, from reaching the combustible body of the tile. Cork acoustical tile is by nature slow in burning, and also falls in this category. Before installing slow-burning materials, however, it would be wise to check with local authorities to be certain of their acceptability.

In some cases, it's desirable to maintain the same ceiling appearance in two adjacent areas, only one of which requires an incombustible material. For economy, that area could be treated with a perforated mineral fiber tile, the less critical area with the inexpensive cellulose fiber material in the same perforation pattern. Since the designs will match exactly, the combination is both attractive and practical.

MOISTURE-RESISTANCE

Conditions of excessive humidity, as found in commercial kitchens, swimming pools and steam or shower rooms, call for an acoustical material with exceptional resistance to moisture. Cork is the acoustical material with the greatest moisture resistance, and its use is recommended where conditions are especially severe. When humidity levels only slightly above normal are expected, or when sanitation codes demand frequent washing of the ceiling, the metal pan, asbestos board or plastic-faced materials may be used without running the danger of excessive water absorption.

LIGHT-REFLECTIVITY

In office areas, adequate light reflection is a primary requirement of any ceiling surface. The proper degree of light reflection is a valuable asset to either natural or artificial lighting and a necessity to visual health wherever close work is done.

Most acoustical materials are available in a white-painted finish that reflects between 70 and 80 per cent of the light that strikes it, without causing annoying glare. When accumulated dirt diminished the light-reflectivity of an acoustical ceiling, cleaning or repainting with a good grade of paint will restore the reflectivity either completely or to a fully satisfactory degree.

ECONOMY

As with a good many other interior finish materials, the cost of an acoustical installation varies with each individual job. Depending on the job conditions, one material and method of installation may be more expensive one time, less expensive the next. Initial price of the material is not a good criterion of cost, since different installation methods may cause a wide variation in the total cost. The price picture may be altered, too, by important savings in maintenance and in fire insurance rates, where a fire-safe material is installed.

Metal pans, for instance, are the most expensive acoustical material from the standpoint of initial cost. However, let's take an hypothetical situation and see how metal pan can prove to be an extremely economical installation.

A loft building is to be converted into general office space, and one floor is to be rented to a tenant who wants metal partitions to provide a flexible space layout.

By installing a suspended ceiling—that is, one that hangs down from the ceiling on metal rods—we can provide space above to conceal heating and air-conditioning ducts, plumbing and sprinkler system pipe, and wiring for lighting fixtures. Because the ceiling area is large and unobstructed by col-

ACOUSTICAL MATERIAL COMPARISON CHART

PRODUCT	Noise Reduction Efficiency*	Cost	Fire Rating	Maintenance	Light Reflect. Value
Regularly Perforated Cellulose Fiber Tile....	55-85%	Low initial cost. Installation cost low to medium, depending upon method.	Combustible. Slow-burning when ordered with special paint finish	Repaintable without loss of efficiency. Easily cleaned.	72-80%
Random Perforated Cellulose Fiber Tile....	50-80				77-78
Slotted Perforated Cellulose Fiber Tile....	60-75				75-76
Fissured or Textured Cellulose Tile (Wood Fiber)	50-75			Easily cleaned with vacuum cleaner. Careful painting won't effect efficiency. Cork easily cleaned with damp cloth.	77
Fiscured or Textured Cellulose Tile (Cork)..	35-55	Medium initial cost. Medium installation cost.	Slow-burning.		76
Perforated Mineral Fiber Tile	50-90	Moderate initial cost. Medium installation cost.	Incombustible	Easily cleaned. Repaintable without loss of acoustical efficiency.	76-84
Fissured Mineral Fiber Tile	55-85	Moderate initial cost. Medium installation cost.	Incombustible	Easily cleaned with damp cloth or vacuum cleaner. Careful repainting won't affect efficiency.	74-81
Textured or Smooth Mineral Fiber Tile..... All factors vary widely depending on manufacturer	40-95	Low to moderate initial cost. Medium installation cost.		Easily cleaned with vacuum cleaner. Extremely careful repainting necessary in some cases. No extra care in others.	70-79
Membrane Faced Mineral Fiber Tile or Board.....	60-80	Moderate initial cost. Medium installation cost.	Incombustible	Plastic membrane Easily cleaned with damp cloth. May be repainted.	61-68
Perforated Metal Pans with Mineral Fiber Pads	55-95	High initial cost. High installation cost.		Repaintable and washable.	71-81
Perforated Asbestos Board Panels with Mineral Fiber Pads....	65-90	Medium initial cost. Medium installation cost.		Easily cleaned. May be repainted without loss of efficiency.	73

Data from Bulletin XVI of the Acoustical Materials Association and files of the Armstrong Cork Company.
* Actual range depends on thickness of material, and installation method and manufacturer. Any one product, in a specific thickness by a specific manufacturer, has a range of ten points, i.e., 75-85.

umns or wall-to-ceiling partitions, the metal pan units are installed so rapidly that labor time is reduced to a minimum. Flush lighting fixtures, scaled to fit in perfectly with the acoustical tile, are used to reduce on-the-job fitting. Air conditioning and heating diffusers are eliminated by using the holes in some of the metal pans to distribute the cool and warm air to the room's occupants.

These steps have already saved on installation costs, but there'll be even more savings in the future. The use of incombustible metal and mineral wool has helped reduce the fire insurance rate. The smooth, baked-

enamel finish guarantees minimum cleaning time, and the suspension method used permits any one or more of the tile to be taken down and replaced in a matter of seconds, for quick access to the duct work, piping and wiring above.

In addition, the tenant has been provided with an attractive ceiling in which lighting, heating, air conditioning, fire protection and acoustical treatment have been integrated into a handsome unit—no small matter when the rental rates are agreed upon.

Of course, this is an extreme case. But it should make the point that the comparison chart reproduced here is able to give only a very basic idea of the relative costs of different types of materials. When the time comes to develop new properties, or modernize older ones, a phone call to a reputable acoustical contractor will bring expert advice on meeting individual acoustical requirements. And if he's called in while plans are still in the development stage, he can probably give some money-saving suggestions on combining sound conditioning with all the other modern facilities that future tenants are going to expect.

KANSAS CITY'S NEW TWA BUILDING . . .
and how it grew (*Continued from page 239*)

Any monies remaining in the budget amount, after all proper charges for building operation were made, then would be divided equally between Trans World Airlines and ourselves at the close of each lease year. Our share would be our fee.

Experience exchange reports were used and adjusted to the local area to determine the budget amount. Under such an arrangement the tenant is assured of efficient management, and the management has the opportunity of a better than average fee, if it is efficient and will assume such a risk.

Undoubtedly some form of this arrangement has been used in other parts of the country in large buildings or developments, but it marked the first time this type of cooperative venture was used in Kansas City. However, this loose end, concerning management, was the contributing factor to completing the deal for Trans World Airlines new building.

First of all, there are basic differences between budget-making for a co-op and for a conventionally rented building. Mr. Watkins highlights these, then goes on to explain the art of preparing and presenting the co-op budget. Especially clear and helpful are the exhibits of the model budget prepared by the author's organization and used here as a basis for analysis.

HOW TO PREPARE THE BUDGET FOR A CO-OP

by William A. P. Watkins, CPM

IN MY OPINION it is practically axiomatic that to manage a piece of property successfully and efficiently the manager must have constantly in mind a management program —a plan for the future of the property, aimed at a definite goal.

There is no more vital component of this management program that the operating budget prepared annually by the managing agent. It must be accurate in all details and realistic in that it is, in the case of a rental building, a forecast of net income which the owner may anticipate and count on receiving during the coming year. It must reflect the manager's knowledge of the owner's attitude toward the property, whether it be a cooperatively owned building or a conventionally rented one and, in the latter instance, whether the owner regards it as an investment to hold for a long period of time or as a speculation to be sold for a profit at the earliest possible date.

It must take into consideration any large predictable items of expense such as taxes, mortgage interest and principal payments and major non-recurring items of repair, maintenance and replacement of equipment. Reserves for such large items of expense must be set up so that they can be met when due. It is the standard practice of our office to prepare a statement at the end of each fiscal year which shows in detail the budget for the previous year, the actual operating figures for that same year for purposes of comparison and budget for the coming year. If the budget has been properly prepared with an accurate forecast of income and expenses, the net result should not deviate between the budgeted and actual figures by more than two or three per cent. It is a source of considerable satisfaction to us when this result can be shown at the end of the operating year and goes a long way toward convincing the owner or owners of the property that we know our business.

All of the above is true, whether the property be large or small, residential or commercial, but for the purpose of this discussion I am going to confine myself to

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residential cooperatively owned buildings of the fire-proof elevator type and mention a few basic differences that go into the preparation of the budget for such a structure, depending on whether it is a conventionally rented building or is cooperatively owned and operated.

DIFFERENCES BETWEEN CO-OP AND RENTAL

Perhaps the greatest difference between the operation of a rental building and a co-op is that in the latter it is not necessary to set up the income and expense figures to produce net income. While it is true that the reserves for major expenditures mentioned above must be taken into consideration, and while it is equally true that some anticipated items of repair, maintenance or replacement may not actually occur during the budget year, the co-op owner expects the managing agent to keep the annual assessment necessary to meet operating expenses at a minimum and not to pad the budget just for the sake of being on the safe side and making the agent look good.

It is a simple matter to produce a budget with estimated operating expenses sufficiently high to insure actual expenses being substantially lower than budgeted, but this does not represent the accurage forecast that is considered to be the necessary basis of the budgeting procedure.

Another basic difference between the co-op and the rental building budget is that in the case of the latter, the agent must be governed in his estimates of income by his knowledge of the rental market and what the building can produce. There is no point in setting up an estimate of gross income based on raising rents 15 per cent over the previous year if a raise of more than 5 per cent will produce substantial vacancies.

On the other hand, the owners of a co-op can control total expenditures on their building (and the assessments which must be paid to meet those expenses) by their desires on how they want the building operated, maintained and staffed. They may elect to employ elevator operators and doormen, though it can be demonstrated that the cost of installing automatic elevators can be amortized in three to five years, depending on the size of the building and the number of elevators on which operators are employed. The owners may elect to maintain their building in spick-and-span condition, decorating the lobby, front halls and painting other public spaces in the building at more frequent intervals than might be considered absolutely essential in a building where the gross income was necessarily controlled by the rents obtainable.

As a general rule the owners of a co-op will demand a higher degree of perfection in the maintenance of a building than will the owner of a conventionally rented property, just as the owner of a home will take better care of the house he occupies than a tenant would do. Therefore, in the preparation of an annual operating budget for a co-op the manager must be familiar with and keep constantly in mind the tenant-owners' wishes with respect to the standards of service and maintenance of their building, just as the owner's attitude toward his property must influence proposed expenditures in a rental building.

Parenthetically speaking, this isn't as easy to do as it is to write. In a cooperatively owned building with from 20 to 100 or more tenant-owners there will be sharp differences of opinion as to the necessity or advisability of some major expenditures, which will be expressed at the annual shareholders' meeting at which the proposed budget is presented. These opinions will guide the building corporation's board of direc-

tors in their approval of the operating budget for the coming year, including all items of expenditure and the establishment of the monthly assessment, or rent, for the coming year.

FIRST STEPS TO TAKE

Keeping these preliminary observations in mind, we come to the actual preparation of the budget. Before it can be commenced the manager must have full and complete information at hand concerning the building's physical condition and the major items of repair, maintenance and replacement which, in his opinion, should be included in anticipated expenditures for the coming year. A day-by-day familiarity with the property will supply the manager with much of this information. His maintenance record book will show him when the roof was last repaired or replaced and if the guarantee is still in effect; when the exterior window frames were puttied, painted and caulked; when the building was tuckpointed and whether the job was done on an "as necessary" or "solid and full" specification, and many other pertinent items of information to indicate the building's needs during the next twelve months.

The building's janitor or superintendent will also know of any specific items of repair or replacement, mechanical or structural, that should receive attention. In addition to these sources of information we believe that a thorough and detailed inspection of the building is an essential preliminary to the preparation of a budget. It has been found that such an inspection can be most thorough and effective if a check list inspection form is used. The Standards and Planning Committee of the Institute of Real Estate Management has prepared some very excellent forms covering residential buildings, interior and exterior, and they are available at the Institute's headquarters office.

With the information from the above sources at hand, and particularly the inspection report, a brief but concise narrative type of physical report on the building is written and a copy prepared for each tenant owner. This report gives the owners a complete picture of the physical condition of their property, just as does the audit in connection with the building corporation's financial position. It reviews maintenance of previous years and, if no repeated expenses are contemplated in the immediate future in connection with these items, points up the fact that the owners' money was expertly and judiciously spent.

Of even more importance, it highlights the large items of extraordinary and nonrecurring expense which the manager has included and recommended in his budget. It explains these in detail, the necessity of doing these jobs, the estimated cost of each and where this additional information applies, the date in which this work was last completed. A recapitulation of these recommended extraordinary expenditures is given on the final page of the physical report.

COMPARE THIS MODEL

Perhaps the most direct and clearest approach to the discussion of a co-op budget is by reference to an actual one, as reproduced here. The name of the building corporation has been changed for obvious reasons, but apart from that the figures are those as presented at an annual shareholders meeting of one of the cooperative corporations managed by our company.

The first page shows the comparison between budgeted and actual operations for the year just ended, plus the proposed budget for the coming year. Page 2 gives comparative information on certain major

items of expense over periods of years which it is believed is of interest to the owners and which illustrate the thinking that has gone into the preparation of the estimates.

It should be kept in mind that the budget is prepared on a cash basis as against the accrual basis customarily employed by the auditing profession. In considering the annual regular assessment (rent) to be established to meet the year's operating costs the co-op owners want to know just that—how much money will be required to operate the building during the ensuing twelve months. A good illustration of this point is insurance. It is not difficult to ascertain the premiums that will fall due and must be paid during the coming year, and that is the figure that should be included in the budget. The fact that the review of actual operations on a cash basis will vary in some details from the auditor's figures prepared on an accrual basis was found to result in some confusion in the minds of the tenant owners. As a result, a short reconciliation between operations on a cash and accrual basis is now included as a part of the audit.

Although the income figures appear at the head of the columns on the budget sheet it is easy to see the income cannot be determined until the operating expenses have been established to the manager's satisfaction as to their accuracy and the amount of income required has been thus determined.

BUDGETING A DEFICIT

In setting up income for the coming year prior to the annual meeting, we customarily use the same basis of computing the assessment per share of stock owned as in the previous year. If a substantial deficit is apparent, the manager should be prepared to explain the reasons for it in detail and to suggest the manner in which it can be met, namely, a special assessment, an increase in the regular assessment (rent), or a way in which the operating expenses can be reduced.

The special assessment is, as the term implies, a "one shot" payment. If the building is faced with a major and non-recurring expense, such as the conversion of elevators from manual to automatic operation, the cost can be prorated among the owners, providing the corporation's working capital is insufficient to meet the cost of the job. Many cooperatives' boards of directors are reluctant to seriously deplete the corporations' cash reserves, and there is no sense in raising the regular monthly assessment substantially to pay for an item which it is known will not appear on subsequent budgets.

On the other hand, if it is apparent that a budgeted deficit is brought about by steadily rising taxes, salaries and operating expenses in general, the honest and practical approach is to increase the regular basic assessment to a point where income will balance normal outgo. We are witnessing such a steady rise in operating costs in the management of all types of property and the manager must make the tenant owners realize that the same economic forces operate against the co-op as against the rental building.

The third device available in considering ways and means of eliminating or reducing a budgeted deficit, namely, that of effecting economies, often produces some interesting results. Owners will complain that their rent is getting "out of hand" and yet will be reluctant to do without some refinement of service or equipment which could save them money. Often these refinements are demonstrably non-essential and can be classified as luxuries, but when this has been pointed out the owners are still reluctant to eliminate them.

We have found that when a situation

such as this arises it is helpful for the manager to produce a chart using the old device of the budget dollar and where it goes percentage-wise. This chart with its pie-shaped sections representing the various items of budgeted expense is visual evidence of the small portion of the budget that can properly be considered as controllable through the agent's efforts and efficient operation.

I recall one instance where the tenant owners were unhappy with their regular assessment. The building's board of directors was convinced of the necessity for the increase and the soundness of the reasons for it, but it was the chart of which I am speaking that sold the tenant owners as a whole. The chart showed the following:

	Percent of Total Budget
Real estate taxes	26.2%
Mortgage interest & principal	24.8%
Payroll	25.4%
Fuel	5.7%
	82.1%
All other operating costs	17.9%

The four items totaling 82.1 cents out of every budget dollar were singled out for very good reasons. A valuation protest case had been carried to a successful conclusion at the time of the last quadrennial assessment and it was not believed possible to reduce the tax figure further. Mortgage amortization and interest were considered a fixed charge. The management had suggested economies through reductions in payroll which it believed would not seriously curtail services being rendered, which suggestion the tenant owners had rejected. They had also insisted that steam at full pressure be continued to be furnished 24 hours a day; a practice which the management had pointed out was uneconomical and except in certain special circumstances unnecessary. Looking over the other items in the remaining 17.9 per cent of the budget dollar and which individually varied from 4.5 per cent to 0.1 per cent there seemed little chance of substantial saving through economy, and the tenant owners accepted the recommendation of their directors and management.

NOW LOOK AT OPERATING EXPENSES

Leaving the income portion of the budget for the moment it will be seen that the management considered an increase in operating expenses inevitable. The breakdown of operating expenses shows that the anticipated increases are principally in the categories of payroll, fuel, repairs and maintenance, and insurance. It should be possible for the manager to be sufficiently conversant with the labor and union situation in his locality to hit this figure very closely. An increase in the price of fuel was anticipated and proved to be correct; and the insurance item of $1,850 covered the premiums known to become due during the year.

REPAIRS AND MAINTENANCE

It will be noted that the repair and maintenance item was budgeted at the same figure as the previous year, even though the actual expenditures had been nearly $500 less. In arriving at a budget figure for repair and maintenance the manager must rely on his knowledge of the physical condition of the property plus experience in previous years. The building in question is over 25 years old and from time to time leaks occur in water and steam lines and drains that are buried in walls and floors and therefore are not subject to inspection and accurate anticipation of cost of repair. For this reason a cushion of approximately $500 is included in the repairs and maintenance budget as a reserve for such contingencies.

TAXES

Real estate taxes should not be too difficult to estimate accurately except perhaps in the first year of each quadrennial tax assessment. In Chicago, there is an organization, the Civic Federation, which among other activities acts as a watchdog on the spending of the city and county governmental bodies. This Federation has an enviable reputation of accuracy in its forecasts of tax figures for the year ahead and the manager can use its predictions to advantage in setting up his tax budget and reserve. It will be noted that a very substantial increase in taxes is anticipated in the sample budget. The budget year ending February 28, 1957 happened to be the first year of the quadrennial. Although the assessed valuation protest filed by the building corporation was successful to the extent of reducing the taxes by a substantial amount, the results were not known when the budget was written and the higher anticipated figure was used. However, a tax reduction fee was also included under extraordinary expense.

Interest and principal are known quantities not subject to variation unless the terms of the mortgage are such as to make feasible and desirable a recasting of the mortgage or complete refinancing with resultant lowering of the monthly payments.

EXTRAORDINARY EXPENSE

Extraordinary expense calls for little comment. In a budget this item should include major items of non-recurring repair and maintenance or replacement of equipment, as previously mentioned. Conversely, if the owners decide on a major item of expense during the middle of the year, such as redecorating and renovating the building's front lobby, and if that expenditure not being anticipated and therefore unbudgeted, throws the budget completely out of balance, its proper place in the "actual" column is under Extraordinary Expenses.

In the sample budget column for the year ending February 29, 1956 there appears a credit item of $3,395.43. "Conversion to A. C." The building's conversion from direct to alternating current was completed during that fiscal year and the portion of the expense assumed by the Commonwealth Edison Co. resulted in a net to the building, the building's share having been paid in previous years and recorded as an extraordinary expense.

The reader may be wondering what happened in the year ending February 28, 1957, since an $11,000 deficit was forecast, against a practically break-even operation the previous year. The main increase being in taxes, and a valuation protest being contemplated, it was decided to cover the tax increase by a special assessment pending the outcome of the protest. The regular assessment was increased in amount sufficient to meet the rise in operating expenses which, being principally in building personnel wages, was considered to be permanent.

COMPARATIVE COSTS EXHIBIT

The figures on comparative costs graphically illustrate for the tenant-owners' information the increase in major items of expense since the organization of the cooperative building corporation in 1947. From the standpoint of the manager's ability, know-how and efficiency these items may be considered almost beyond the scope of his control. Wages are established by contract between the various unions and representatives of the management industry. In this instance the number of building employees was determined by the owners themselves and was more than the management

NORTHLAKE BUILDING CORPORATION

BUDGET YEAR ENDING FEBRUARY 28, 1957

	Budget Year Ended 2/29/56	*Actual Year Ended 2/29/56*	*Budget Year Ending 2/28/57*
Incomé from Assessments	$101,250.00	$100,671.00	$101,250.00
Real Estate Tax Refund	160.00		233.76
TOTAL INCOME	$101,410.00	$100,671.00	$101,483.76
Operating Expenses	$ 58,176.67	$ 57,809.04	$ 59,884.80
Real Estate Taxes	20,700.00	20,782.00	29,076.88
Interest and Principal	21,816.00	21,816.00	21,816.00
	$100,692.67	$100,407.04	$110,777.68
OPERATING NET	$ 717.33	$ 263.96	$ 9,293.92 (Def.)
Extraordinary Expenses	1,032.57	1,155.27	1,750.00
CASH BALANCE	$ 315.25 (Loss)	$ 891.31 (Loss)	$ 11,043.92 (Loss)
OPERATING EXPENSES:			
Payroll	$ 29,100.00	$ 29,063.68	$ 29,824.80
Water	450.00	420.30	450.00
Electricity	2,200.00	2,479.86	2,500.00
Fuel	6,150.00	6,186.49	6,660.00
Repairs and Maintenance	9,500.00	9,022.19	9,500.00
Janitors' Supplies	750.00	752.20	750.00
Insurance	1,676.67	1,684.93	1,850.00
Payroll Taxes	725.00	704.95	725.00
Audit	650.00	650.00	650.00
Miscellaneous— (Legal, Franchise Tax, City Fees, Etc.)	900.00	804.18	900.00
Management	6,075.00	6,040.26	6,075.00
	$ 58,176.67	$ 57,809.04	$ 59.884.80
EXTRAORDINARY EXPENSES:	$ 3,395.43 (Cr.)	$ 3,395.43 (Cr.)	
Conversion to A. C.	4,428.00	4,550.70	
Exterior Painting			
Tax Reduction Fee			$ 1,750.00
	$ 1,032.57	$ 1,155.27	$ 1,750.00

Page 1 of model budget shows the comparison between budgeted and actual operations for the year just ended, plus the proposed budget for the coming year.

NORTHLAKE BUILDING CORPORATION

COMPARATIVE COSTS

PAYROLL	*Original Budget*		*1955*		*1956*
Engineer	$ 258.76		$ 378.40		$ 378.40
2 Assistant Janitors @ $171.25	342.50	@ $285	570.00	@ $285	570.00
5 Elevator Operators @ $135.00	675.00	@ $233	1,165.00	@ $233	1,165.00
Relief Operator	122.00		219.00		219.00
Vacation Pay	50.00		92.60		95.00
Allowance for Increase	—		—		58.33
MONTHLY	$ 1,448.26		$ 2,425.00		$29,824.80
ANNUALLY	$17,379.12		$29,100.00		$29,824.80

	Original Budget	*1953*	*1948*	*1955*	*1956*
FUEL COSTS	$7.56	$9.76	$11.66	$10.25	$11.10

Estimated Average Yearly Consumption—600 tons $6,660.00

REPAIRS & MAINTENANCE:

1948	$ 8,605.68	1951	$12,897.94	1954	$ 9,019.56
1949	11,688.52	1952	8,953.59	1955	9,126.16
1950	8,084.24	1953	10,123.04	1956	9,022.19

REAL ESTATE TAXES:

1946	$13,705.82	1949	$16,905.64	1952	$19,441.00
1947	14,473.60	1950	17,101.30	1953	19,538.26
1948	16,821.56	1951	17,701.16	1954	20,359.56
				1955	29,076.88

AVERAGE ANNUAL INSURANCE PREMIUMS:

Fire Insurance	$1,097,300	$ 550.65
Public and Elev. Liab.	$ 500,000/$1,000,000	1,016.00
Property Damage	$100,000	
Boiler Insurance	$100,000	58.32
Rental Insurance	$ 47,625	25.08
Workmen's Compensation		225.82
		$1,875.87

Premiums Payable This Year $1,850.00

Page 2 of the model budget gives comparative information on certain major expense over periods of years, which the manager thinks will be of interest to the owners.

considered essential to the operation of the building. Fuel prices had fluctuated, but the ultimate direction was up. Repairs and maintenance had not varied a great deal in total. And the rise in real estate taxes is familiar to all Chicago property owners.

The sample budget for the year ending February 29, 1956 was prepared by one of the other CPMs in our office and when placed alongside the actual operating figures for the same year admirably illustrates the accuracy of forecast which was mentioned earlier in this article as being of prime importance. The operating net before extraordinary expense was $453.37 less than budgeted—and the final result after extraordinary expense showed a deficit greater than budgeted by $576.07—both figures approximating one-half of 1 per cent of the total estimated of operation of over $101,000. This in itself is not necessarily an impressive demonstration of accuracy, because it is possible to adjust income to balance expenditures by action of the building corporation's board of directors.

What makes this budget, in my opinion, an excellent example of careful and knowledgeable procedure is the fact that operating expenses—the figures that illustrate a manager's familiarity with a building, its physical condition and operating requirements—show a variation of considerably less than 1 per cent between budget and actual.

It should be pointed out that in the case of the budget under discussion there does not appear a reserve for contingencies, with the exception of the $500 in repairs and maintenance. This building has, over a period of years, accumulated working capital in reserves that was considered to be ample to meet any emergencies that might arise, and the directors decided there was no need to increase the cash reserves further.

We consider it good practice to try to write a budget in which the income exceeds the expenditures by a small amount, or at worst, forecasts a very small deficit. You will see from the income-from-assessments figures that if all rents had been paid up in full when the corporation's books were closed on February 27, 1956, we would have missed an exact forecast by just $2.93.

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